

# Railway Age Gazette

Including the Railroad Gazette and The Railway Age

PUBLISHED EVERY FRIDAY, AND DAILY EIGHT TIMES IN JUNE, BY  
THE RAILROAD GAZETTE (INC.), 83 FULTON ST., NEW YORK.

CHICAGO: Plymouth Bldg. CLEVELAND: Williamson Bldg.  
LONDON: Queen Anne's Chambers, Westminster.

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Subscriptions, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free:

United States and Mexico .....	\$5.00 a year.
Canada .....	\$6.00 a year.
Foreign Edition (London).....	£1 12s. (\$8.00) a year.
Single Copies .....	15 cents each.

Shop Edition and the eight M. M. and M. C. B. Convention Daily issues, United States and Mexico, \$1.50; Canada, \$2.00; Foreign, \$3.00.

Entered at the Post Office at New York, N. Y., as mail matter of the second class.

VOLUME 49.

FRIDAY, JULY 8, 1910.

NUMBER 2.

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MANY rumors have been current within the last few weeks of railway enterprises abandoned and vast retrenchments in expenditures made because of political complications and fear of crop failures. The pictures painted are dark, and have led many to take a gloomy view of the situation. It has been asserted in some quarters that the policy of the railway heads is one of retaliation for recent federal legislation. A great deal of this outcry is unwarranted. Investigation by this paper shows that on a majority of roads the construction and maintenance forces are about the same as in normal years. Many projected enterprises have been postponed and little new work is being started, but such work as reballasting and relining of track are going on about as usual, and the forces commonly employed to maintain roadbed and structures in good condition have not been reduced any more than has seemed absolutely necessary. The railway managers are trustees for their stockholders, and as new legislation is going into effect they are

acting as any prudent business men would act in similar circumstances. The most authentic reports indicate that there will be large crops. It is a matter for regret that so much important work has been delayed, but if the crops are good and a more conservative policy of railway regulation prevails conditions no doubt will rapidly improve.

WHEN President Mellen received his honorary degree at Yale, a few years ago, it was stated unofficially that he got the honor primarily not so much as a tribute to his powers as a railway officer, but rather as a gifted rhetorician. This year Harvard honors J. Pierpont Morgan not as a great banker and railway promoter, but as a benefactor and patron of art. Outwardly and officially, President J. J. Hill gets his degree from Yale "straight," so to speak—that is, as an upbuilder of a great railway system. But behind his degree, as an *arrière pensée* and reserved thought, is his recent excursion into economic literature and the national problem of bucolic production. The three honorary degrees, taken together as bestowed by our two great eastern universities, suggest a keynote of scholastic policy. It is not enough that a big railway man should master the physical, and upbuild mighty systems of transportation. He must blend with it also an ingredient of "culture" and reach out into esthetics, into ethics, into economics on a national scale, and into the rest of cultured arcanum. All this has the true Augustan and Cæsarian smack. Great bankers, now in bud, clerking it in the Street, and embryo railway sovereigns, toting the surveyor's rod, will take notice and inform themselves early of Phidias and Demosthenes and the ultimate value of the fourth dimension. Chancellor Day, of Syracuse, and other exponents of the higher education accused of hunting overmuch the oleaginous dollar will take the lesson to heart when Yale and Harvard tell us that the thought of the ultimate benefaction perishes save as it is allied with mental culture, and that Minerva, not Vulcan, sits at the head of the table in railway directorates. And, incidentally, the Chicago undergraduates' doxology, beginning "Praise John, from whom all blessings flow," must be amended along less secular and more artistic lines.

PRESIDENT TAFT, after an extended conference at Beverly last Friday with Chairman Knapp of the Interstate Commerce Commission, let it be known that the added authority given to the commission by the new law "is not to be used arbitrarily or for the purpose of hindering the railways in the conduct of their legitimate business. The power to suspend new rates is to be used only in exceptional cases. \* \* \* Chairman Knapp declared that there was nothing on the face of things to show that the new rates [recently proposed by the roads] were unjust or unreasonable. The power of suspension will be applied only to rates where a preliminary hearing gives indication that they are excessive. It is not believed that in any case will it be necessary to avail of the full limit of eleven months allowed under the law. \* \* \* Stock manipulators in Wall street, the administration has been informed, were attempting to trade upon the doubts as to what the commission will do and to make the most of the situation to their own advantage. It was never intended that the new law should be a club or that it should be made the means of profit-taking by 'bears' in the market. The commission will not 'run amuck' and will do nothing to jeopardize the interests of investors." These quotations are from a statement evidently framed by the agent of the Associated Press, and are not to be taken as official; but they may be called pretty nearly official, and they will raise a number of queries. The last part of the statement gives evidence of good sense; but how about the "insurgents," who put into the law that clause requiring the railways to prove the reasonableness of every proposed increase in rates? Chairman Knapp has ample facts to warrant him in his assumption that an increase at the present time is reasonable; but the clause referred to would seem to require him to assume that it is unreasonable—and let the railways demolish the assumption if they can. Again, Chairman Knapp is not the whole commission. President Taft, already criticised for telling Con-

gressmen what they must think, seems to be turning his attention to Chairman Knapp! Some of the correspondents seem to think that there is in the Interstate Commerce Commission a strong radical element opposed to the moderate views of the chairman. We believe in the fair attitude of the commission and we do not wish to encourage the pessimist to take advantage of the hot weather to work his evil purposes; but it is well to remember that Beverly is a long distance from Iowa and Wisconsin.

#### THE WESTERN FREIGHT RATES CASES.

THE various cases involving the freight rates of the transcontinental railways into the western intermountain country are the most important ever heard by the Interstate Commerce Commission, in point both of the principles involved and of the amount of money at stake. Shippers and railways have awaited the decisions with intense interest and anxiety. The six opinions rendered last week in these cases were received with varying thoughts and emotions by the numerous carriers and the many communities affected. The consensus of sentiment of those who have studied the western rate situation, who are competent to apply the principles of railway economics to it, and who try to appraise the commission's course without prejudice, probably is that it has tried hard, ably and conscientiously to deal equitably between the shippers and the railways, and that developments will show that it has arbitrated with approximate justice between them.

The principles on which its orders are based seem open to very little criticism. The first of the proceedings in question begun was that of Spokane. The commission, in the opinion rendered by it in this case in the spring of 1909, gave the impression that it held the rates to Spokane unreasonable on the ground that the earnings of the Northern Pacific and the Great Northern were excessive. In the opinion on the Spokane case rendered last week the commission repudiates this impression as "an entire misconception." It states that it inquired into the financial conditions of these companies to ascertain whether their rates constitutionally *could* be reduced, not whether they *should* be. Having found that their earnings were so large that their rates could be reduced without confiscation, it ordered reductions, not merely because it considered the revenues of the carriers excessive and for the purpose of curtailing them, but because in its judgment the rates themselves were exorbitant as measured by the cost and the value of the services rendered for them, the density of the traffic, the rates charged by other railways on like commodities under similar conditions, etc. This emphatic disavowal of any intention to rule that the rates of a railway should or may be reduced solely because its profits are large is gratifying.

While the commission concedes that, where water competition is controlling, the railways are justified by decisions of the Supreme Court of the United States in charging a higher rate for a shorter than for a longer haul, it shows a tendency to deny the force of water competition on the Pacific coast, especially in the opinion by Commissioner Lane in the case of Railroad Commission of Nevada vs. Southern Pacific, which in this respect seems in marked contrast to the tone of the opinion rendered by Commissioner Prouty in the Spokane case a year ago. There is also a very interesting paragraph bearing on this phase of the matter in the opinion just rendered by Commissioner Prouty in the Spokane case.

"If," said Commissioner Prouty, "we were free" (that is, not trammelled by past decisions of the Supreme Court) "to take into account all the competitive conditions existing both east and west and to determine what, in the light of all these conditions, would be a just and reasonable relation between the rates to Seattle and Spokane, a somewhat different question would be presented."

The new Mann-Elkins act frees the commission from the trammels put on it by decisions of the Supreme Court. It apparently gives it unlimited discretion to determine when a higher rate may be charged for a short than for a long haul. Does the statement quoted signify that the commission, with

its new powers may change its attitude toward the long-and-short-haul matter?

Sound principles are very important things. They are not less important in rate making and rate regulation than in other matters of moment. But in practical affairs ability to formulate correct principles is less vital than sound judgment in applying them. The managements of the transcontinental lines are less interested at present in the abstract principles enunciated by the commission than in the heavy reductions in rates which the commission believes should be made to give proper effect to those principles. The proposed reductions in class rates from Chicago and the Mississippi and the Missouri rivers to Spokane, Utah common points and other places similarly situated are from 8 to 20 per cent., and even greater cuts in commodity rates to intermountain points are proposed. Reductions of 20 per cent. are also proposed in the so-called "distributive" rates eastward from Seattle, San Francisco and other Pacific coast points. For some of the foregoing reductions no date is fixed and no order is now made. The roads are required to furnish an accurate account for the months of July, August and September, or for such other representative months as may be determined on by the commission after conference with them, showing the difference between the earnings on traffic actually moved under present rates and what the earnings would have been had the proposed rates been in effect. When the commission has this data it will make its final orders. By far the most drastic reductions proposed—and these reductions are ordered to be made effective on October 1—are those in the rates of the Southern Pacific from Sacramento, Cal., to Reno, Nev., which are cut approximately 33 1/3 per cent., and in the rates from the east to Nevada, which are cut 50 per cent. The latter reductions also will be felt mainly by the Southern Pacific. The commission found that the rates from Sacramento to Reno are the highest in the United States, and that the rates from the east to Nevada are the highest for long hauls in the United States.

No one is surprised that the commission decided on substantial reductions in the rates to the western intermountain territory, and particularly in those from both the east and the west to Nevada. All these rates were made when both transportation and industrial conditions in the section affected were widely different from what they are now. In consequence of these changes of conditions many of the rates had become plainly too high. The only question was as to how great reductions would be required. Whether those ordered and those the commission has indicated it probably will order are too drastic—and they are drastic, indeed—can be best determined by the three months' record which the commission directs to be kept. Even if the reductions finally ordered are substantially less than those now proposed, the earnings of the railways are sure to be materially curtailed. But this curtailment of earnings is apt to be temporary. For irrigation, the growth of mining development and the influx of population are causing a rapid increase in traffic in the West which will in a comparatively few years repair the breach made in railway earnings, if it is not too large.

On the whole, the opinions in these cases should, it would seem, inspire optimism rather than pessimism about the future of railway regulation and railway development. They have been interpreted in some quarters to indicate that the commission is pretty sure not to allow reasonable advances in freight rates in other parts of the country. This is not a fair view. While most of the rates to the East on the products of the Pacific coast and the western intermountain country are low, the rates both westbound and eastbound into the intermountain territory have been relatively high—some of them exceedingly so. The commission might, therefore, without inconsistency, order reductions in these rates, and at the same time permit advances in the much lower rates of the carriers farther east. That it clearly recognizes the fact that the general tendency of rates may have to be upward rather than downward in future



is indicated by statements in the opinion by Commissioner Prouty in the Salt Lake Case.

"It is well understood," said Mr. Prouty, "that in recent years there has been a continuous advance in the prices of most materials and supplies used in constructing and operating a railway, that there has been a constant tendency to advance wages, and that all this has tended to increase the cost of operation. Upon the other hand, there has been a steady improvement in the method of handling freight; trains are longer; cars are larger and more heavily loaded; grades are easier; the amount hauled by a given engine is greater; the density of traffic is much greater. All this tends to reduce the expense of transportation. These two sets of causes work in opposite directions and tend to balance one another. It is not certain what the net result has been at any time in the past or is to-day. It is probable that at the outset the economies of operation more than outweighed the increased cost of labor and supplies, but that of late the reverse has been true. . . . It is evident that the total result to net revenues from the operation of these conflicting causes cannot be foretold with accuracy. It is perhaps probable that the effect of increased wages and increased cost of supplies will be more seriously felt in the future than it has been in the past."

This fair, accurate, judicious diagnosis of the transportation situation shows that, whatever may be the attitude of the shippers, the commission refuses to turn its back on the conditions confronting the managements of railways, and encourages hope that it will spare no effort to deal fairly with the roads.

#### PREMIUMS FOR GOOD WORKMANSHIP ON NEW LOCOMOTIVES.

A MOTIVE power officer who has charge of a large equipment, which is being continually augmented by the purchase of new engines in large numbers, said recently that the thing most prominently in his mind at present is the "poor quality of the locomotives we are getting from the builders and their failure to go into regular service without expensive alterations and repairs." This is not a new condition with respect to American locomotives, and it is one which is becoming more serious as locomotives are ordered in larger numbers, and the expense of taking them down and repairing details of large dimensions becomes heavier. The continuous service of these large machines means so much in tonnage hauled and money earned, and on the other hand, the losses are so great when they are laid up for repairs, that a large price can be profitably paid for them to secure good workmanship in their original construction. Locomotives are usually bought in anticipation of a season of heavy traffic, and when they are placed in service there is commonly a period in the midst of the busy season when their weak points are being continually brought out by failures which require them to be laid off for repairs.

The fact that locomotives are built under the inspection of the representative of the railway and accepted by him relieves the builder in a measure of further responsibility. It is well known, however, that this inspection at the works is inadequate, ineffective, and does not secure for the purchaser immunity for the very defects which it is intended to prevent. The average inspector soon succumbs to the charm of the shop superintendent, who finds for him outside attractions which are pleasanter than the grime and clatter of the busy shop. Even if he is most faithful to his duties, where several inspectors are employed at one shop they cannot compass the numerous operations in the various shops which go to make up the complicated mass of details that are finally assembled in a finished locomotive. While this inspection may be useful in a way, it should not relieve the builder from responsibility for the successful performance of the initial mileage of the locomotive in regular heavy service, as it is in this period that most of the defects of construction and materials are usually revealed.

Almost all other large machines, or engines, are purchased under some form of guarantee which includes continuous performance under heavy duty. A driving wheel lathe is bought with a guarantee that it will turn a given number of worn tires in a given time and continue to do this for a definite period. The same is true of axle lathes and boring machines, and the failure of the machine would soon cause it to be thrown back on the hands of the builder. No such thing is ever done with locomotives which break down from numerous failures in their

first week's or month's performance, yet it would seem that such an agreement ought to be feasible and practicable. Large pumping engines for city water works are purchased under a guarantee for successful performance under heavy duty, and their economical performance in rendering a given duty for a very low coal consumption is also guaranteed to the purchaser. Large steamships and men-of-war are given a thorough trial at sea before they are accepted, during which their construction and the quality of the materials used are thoroughly tested. Vessels for the navy are bought under contract which includes a bonus to the builder for each knot they exceed a given speed on measured trial trips, and this stress to which both engines and boilers are subjected in order to attain or exceed the specified speed is such as to determine whether the quality of materials and workmanship are good or poor.

This suggests that it ought to be practicable for locomotive builders to guarantee the initial mileage of engines, under regular service during a given period and be responsible for the principal repairs required during that period. For freight engines this might be 2,500 miles, while hauling the tonnage to which the locomotives are adapted, and for passenger engines it might be 5,000 miles, while hauling the tonnage of cars and maintaining the speeds for which they were designed. The ordinary repairs for which the railway is responsible during this period can easily be obtained from records already at hand; the additional expenses due to poor design, poor workmanship or defective materials should be paid by the builder. As an inducement to the builder to improve the quality of his output a premium might be paid for locomotives which perform their initial guaranteed mileage without exceeding the normal cost of repairs, and it might be advisable to pay an extra price for locomotives purchased under the guarantee of mileage. Figures could easily be obtained to show that even if these premiums and extra prices reached a substantial amount, the policy suggested would be economical for the railway, not only because of the saving in repairs, but also because of the larger earnings derived from the use of a locomotive which is able to perform its regular service without frequent shoppings. The carrying out of this policy would involve the presence of more men from the works on the engines during their initial service. They could have general charge of a group of engines and keep a record of their performances and repairs. These representatives of the manufacturers now see that the new engine is properly set up and started out empty or with a light train, but when the serious work of regular service is begun and the engine breaks down under heavy duty their responsibility has ended and they have gone elsewhere. Under the proposed system they would stand by their guns in the heavy stress of severe service and the information gained by the experience should be valuable to their employers, the locomotive builders. The mileage guarantee system would develop a code of rules which would designate the kinds of repairs for which railways are responsible and those for which the builders are responsible and the conditions which determine when either party should pay the bill. The accounts necessary for adjusting these bills could be kept as accurately and honestly by the railways as by the locomotive builders when they repair worn locomotives; and experience in the repair of foreign freight cars under the M. C. B. interchange rules shows that it would be practicable to adjust claims for locomotive repairs at a foreign shop.

An offer from a locomotive company to make a guarantee of initial repairs would be welcomed by the railways and should secure an abundance of orders at profitable prices which would pay the extra expense involved and save money to the railways. The subject in general involves an investigation of the parts of new locomotives which usually fail or cause engine delays during the first month of their service, the cause of such failures and the best remedy. It will be found that many of these defects are common to all types of

locomotives, and for all lines, and that an earnest effort to correct them would result in large savings. We shall be pleased to receive from mechanical officers and locomotive builders opinions relating to the premium system for new locomotives as here proposed and suggestions as to how it could best be worked out.

## Letters to the Editor.

### DEPRECIATION RESERVES.

June 4, 1910.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have carefully read the article of Henry L. Gray and your editorial comment in your issue of May 27 upon the subject of depreciation. Upon the whole, I incline to Mr. Gray's view. I beg to take issue with you upon the point you make that the amount charged to depreciation should fluctuate according to the perhaps arbitrary views of an executive officer in what you term "fat" and "lean" years.

The instrumentalities of railway operation require renewal from (a) failure by usage and (b) failure by decay. As aptly put by Mr. Gray, the function of depreciation is to keep capital alive. Decay is continuous and is a function of time, and therefore should be charged out monthly the same as interest on bonds. It is not permitted to defer interest charges; why should it be permitted to defer depreciation charges? It seems to me that this "fat" and "lean" juggling of depreciation affords a harmful incentive. For instance, a new general manager with an eye single to "making a record" might reduce depreciation charges for a time (if the law would so permit, of course), and make an excellent apparent showing. In the course of time, however, his engines, cars, etc., would require renewal, with insufficient money set aside for their depreciation. While they were wearing out, the surplus in all probability would be "kept within proper bounds" by numerous rate reductions by the various commissions, based upon the *apparent* low cost of operation on account of low depreciation charges made during that period. Additional capital would then be the only hope, and then charges on watered stock, short time notes, etc.

There can hardly be any doubt that the capitalization on many railways would be lower to-day if capital had not been systematically stifled in years past by the failure to make sufficient depreciation charges or any at all. The regular reservation of amounts from earnings for renewals of wornout equipment, rails, etc., is rational, scientific and conservative, and if followed will redound to the benefit of the stockholder, the public and the railway. When depreciation is not charged, the public early receives the benefit of rates that are too low. This frequently breeds a mushroom development, which is later retarded when the weight of increased capitalization must be borne.

GENERAL SUPERINTENDENT.

Baltimore, Md., May 31, 1910.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The article by Henry L. Gray on the "Necessity of Depreciation Reserves" in your issue of May 27 contains the startling statement that all new ties placed in the road should be charged to depreciation. It would seem that such a statement implies imperfect apprehension of the difference between depreciation and renewals. A charge for depreciation is to take care of wear and tear which cannot be provided for in any other way; such, for instance, as the gradual wearing thin of a locomotive boiler, of which, by the way, Mr. Mahl might make a special note, having in mind a recent statement of his that locomotives are turned out of shop after thorough repairs as good as new. There is no depreciation of this nature in respect of ties. When a tie is replaced it is replaced in all its parts and the new tie is as good as the old tie ever was.

If a company likes to reserve something for tie renewals and charge new ties put to use against the reserve that is quite another thing.

M. B. WILD.

### THE ELECTRIFICATION OF RAILWAYS.\*

BY GEORGE WESTINGHOUSE,  
President, A. S. M. E.

Believing unreservedly that the increased capacity of a railway and its station, the economies of operation, and other advantages will bring about gradually the systematic electrification of steam railways, my wish is that the progress of the art may not be hampered and such electrification of our main lines delayed or rendered unprofitable by mistakes which experience, judgment and foresight may enable us to avoid. It is my intention in this paper to direct attention to the necessity for the very early selection of a comprehensive electrical system embracing fundamental standards of construction which must be accepted by all railway companies in order to insure a continuance of that interchange of traffic which, through force of circumstances, has become practically universal, to the great advantage of transportation companies and of the public.

The great difficulty in the electrification of standard railways is no longer the engineering problem of developing a locomotive and an electrical system which will operate trains, but it is a broad question of financial and general policy of far-reaching scope, considering the future electrification of railways in general as distinguished from isolated cases of limited extent, and requiring a combination of the highest engineering and commercial skill.

*Requirements for Interchange of Traffic.*—To insure interchange of traffic the fundamental requirements, so far as operation by steam is concerned, with full regard for safety, speed and comfort, are very few in number, and are covered by the following:

- a A standard gage of track.
- b A standard or interchangeable type of coupling for vehicles.
- c A uniform interchangeable type of brake apparatus.
- d Interchangeable heating apparatus.
- e A uniform system of train signals.

The additional fundamental requirements for electrically operated railways are:

- f A supply of electricity of uniform quality as to voltage and periodicity.
- g Conductors to convey this electricity so uniformly located with reference to the rails that, without change of any kind, an electrically fitted locomotive or car of any company can collect its supply of current when upon the lines of other companies.
- h Uniform apparatus for control of electric supply whereby two or more electrically fitted locomotives or cars from different lines can be operated together from one locomotive or car.

*Electrical Systems for Railways.*—Three important electrical systems for the operation of railways have been put into practical operation, all using alternating current in whole, or in part. These systems are:

- a The continuous or direct current system, usually spoken of as the "third-rail" system, which employs alternating current for transmitting power when the distance is considerable.
- b The three-phase alternating-current system with two overhead trolley wires.
- c The single-phase, alternating-current, high-tension system with a single overhead trolley wire.

The equipment of the power houses which generate the current is essentially similar in the three systems, but the systems differ in the kind of motors and the auxiliary apparatus for controlling them, and in the methods and apparatus for trans-

\*Abstract of a paper to be presented before the joint meeting of the American Society of Mechanical Engineers and the Institution of Mechanical Engineers, Birmingham and London, England, July 25 to 30, 1910. An appendix, giving statistics as to the electrified steam roads and electric roads for trunk line service, will be published in a later issue.



mitting the current from the power house to the locomotive or car.

#### RAILWAY MOTORS.

Essential requisites in a railway motor are that it shall start its load and quickly accelerate it to the required speed, and that it shall operate continuously at any desired speed or speeds. Railway conditions make desirable speeds varying from the slowest to the highest schedule speeds for regular operation, both for the movement of freight and passengers, and for making up time. The steam locomotive, which is limited in power by its boiler capacity, is capable of continuous operation at any speed up to the maximum, but the maximum speed in a given case depends both upon the length of the train and the grade of the track. It automatically slows down when ascending a grade, so that the actual horsepower developed does not vary greatly at different speeds. The limitation of the capacity of the electric locomotive is not the power available, as is the case with the steam locomotive, but in the capacity of the motors, and is usually fixed by the heating of their coils. An electric locomotive may safely develop for a short time an output which far exceeds its normal continuous capacity. The power and speed characteristics of electric locomotives, therefore, differ from those of steam locomotives. The three types of electric motors have certain fundamental differences in speed performance which are important factors in determining the advantages, disadvantages and limitations of the several systems.

*Direct-Current Motor.*—The direct-current series railway motor automatically adjusts its speed in accordance with the load, running more slowly if the weight of the train be greater, or the grade steeper. The speed with a given load, however, is definite; it is dependent upon the voltage applied to the motor and cannot readily be varied. It is true that the speed can be decreased by inserting a resistance in the motor circuit, but this is wasteful and is inadmissible except as a temporary expedient. It is true also that the motors may be connected in series, thus dividing the pressure between two motors, and thereby reducing the speed one-half; or, if among four motors, to one-quarter speed. As the system of current supply involves a fixed voltage, it is obvious that for emergencies no speeds much above the maximum speed determined in the construction of the motor can be obtained. Furthermore, on account of the high cost involved in maintaining a practically constant voltage throughout the system, the voltage supplied to the motors often decreases considerably at the end of long lines, at the time of heavy load, thereby further reducing the speed attainable. It often happens in railway service that a locomotive should be operated somewhat above the normal speed, and sometimes a locomotive designed for freight service has to be pressed into passenger service. In such cases the speed with the direct-current locomotive would be considerably less than that necessary to maintain the schedule speed. A special form of field control can be used in certain cases for varying the speed, although this has so far been utilized to a very limited extent.

*Three-Phase Motor.*—On the three-phase system the motor is inherently a constant-speed motor; it runs at approximately the same speed at light load and at full load; it runs at nearly the same speed up a grade as on level track, although the horsepower required on the grade may be several times that on the level. Conversely, it can run no faster on a level than it can climb a grade. In order to give a lower speed, however, the motors may be arranged upon the locomotive in pairs in a manner equivalent to the arrangement of two continuous-current motors in series, just described. Motors may also be arranged for two or more speeds, but this involves some complication in windings and connections. In all cases lower speeds can be secured by the introduction of resistances, which increase the losses and lower the efficiency. In no case can the speed in any of the arrangements of motors be appreciably higher at very light load than it is at full load. The motors are of the induction type, without commutators and their inherent limitations, and are of relative simplicity in construction. The current

is usually supplied at 3,000 volts from two overhead lines through two sets of current collectors. With three-phase motors as now constructed and arranged upon locomotives, it is possible with no additional complication so to utilize the motors when locomotives are moving trains upon a descending grade that they become generators and return current to the line, a feature of value in certain mountainous districts, but not of controlling importance in the selection of a universal system.

*Single-Phase Motor.*—The single-phase railway motor is a series motor with speed characteristics very similar to those of the direct-current motor, as the speed at a given voltage is greater or less, depending upon the load. The speed with a given load is also greater or less, depending upon the pressure applied to the motor; and this is not limited, as with direct-current motors, to that supplied by the circuit, and to one-half and one-fourth of that pressure, but is capable of adjustment to any desired degree of refinement by means of auxiliary connections from the secondary winding of the transformer on the locomotive, which is necessary for reducing the line voltage of 11,000 volts to the lower voltage required by the motors. Not only may numerous voltages less than the normal be arranged for lower speeds, but higher voltages can be provided to make possible speeds considerably above the normal. In this simple manner a wide range of efficient speed adjustment is secured which is impossible with other systems.

Like the throttle lever of the steam locomotive, the control lever of the single-phase locomotive may be placed in any one of its numerous notches to maintain the required speed. This facility of efficient operation over a wide range of speed and power requirements is one of the especially valuable features of the single-phase system. This difference, however, may be noted; the ability of the steam locomotive to maintain its speed continuously with heavy loads depends upon the capacity of the boiler; on the other hand, the electric locomotive has an ample supply of energy available, drawn from a large power house, and the limit of its endurance is determined by the safe temperature of the motor.

The question of determination of the frequency for use on single-phase railways is one of very great importance. Twenty-five cycles is in general use for power transmission purposes and has been adopted by nearly all the single-phase railways now operating. The Midi Railway of France has adopted 15 cycles. The lower frequency permits of a marked reduction in the size of a motor for a given output, or, conversely, of a considerable increase in output from a motor of given dimensions and weight. Three-phase installations in nearly all cases employ approximately 15 cycles. The choice of frequency is one of the most involved, difficult and important problems now presented for solution.

*Summary.*—Locomotives equipped with each of the three types of motors have been in successful operation and have demonstrated their usefulness, capacity and reliability in practical railway service. The three-phase motor, having a definite constant-speed characteristic, is particularly adapted to certain conditions; but, on the other hand, it has a less general adaptability to the ordinary varying conditions of railway operation. The single-phase motor has a facility of voltage control which gives an efficient means of speed adjustment, and is in this particular superior to other systems. The relative weights and costs of the several types of motors, and of the locomotives designed to accommodate them, depend upon so many conditions that comparisons must necessarily be general. It will be found, however, that these differences in locomotive cost are in many cases more than offset by the cost of the other elements in the electrical system. The control apparatus for all types of locomotives has been developed so that it is reliable and convenient in operation.

#### TRANSMISSION OF POWER FROM POWER HOUSE TO LOCOMOTIVE.

The controlling factor in the cost of electrification in nearly all cases is the system for transmitting power from the power house to the locomotive, and not the locomotive itself. The choice between the several systems must, therefore, be based

upon a comparison of the complete systems. The differences between the methods of transmitting power are of far greater importance than the differences between power houses or between locomotives. The current for all systems is generated in usual practice as high-tension alternating current, for the reason that electric energy can be most economically transmitted by high-tension alternating current, even though it is in some cases converted into direct current.

*Direct-Current System.*—For the direct-current locomotive the apparatus which intervenes between the alternating-current generator and the locomotive consists of a number of links or elements through which the electric energy must pass, one after the other. These consist of:

- a Raising transformers in groups of three.
- b A transmission line of three wires, sub-stations, which require attendance, containing
- c Transformers in groups of three, and
- d Rotary converters for receiving the alternating current and delivering direct current.
- e A third-rail contact conductor, which for heavy work must often be supplemented by copper feeders.
- f The track return circuit, which must be provided with heavy bonds, and in certain cases supplemented by feeders and so-called negative boosters.

It is necessary to maintain the alinement of the third rail within close limits both in its distance from the track rails and in its elevation above them, as the contact shoe can have only a small range of automatic adjustment.

*Three-Phase System.*—For the three-phase locomotives the respective links between the generator and the locomotives are:

- a Raising transformers in groups of three.
- b Transmission line of three wires.
- c Substation transformers in groups of three.
- d Two overhead wires as the contact system.
- e A track return which usually requires nothing but inexpensive bonding.

The two overhead trolley wires require a double system of overhead construction, as the wires must be kept separate and well insulated from one another; the two must be maintained at equal height above the track and at switches and cross-overs the construction is complicated.

*Single-Phase System.*—For single-phase locomotives there is:

- a A raising transformer.
- b A transmission line of two wires and substations widely spaced, each containing
- c A lowering transformer, which supplies
- d A single trolley wire.
- e A track return, usually requiring nothing but inexpensive bonding.

In certain cases where the distance from the power station is not more than 15 or 20 miles, the single-phase trolley can be supplied directly from the power house, so that only one single element, i.e., the trolley wire, intervenes between the generators and the locomotives. The single trolley wire permits a relatively wide range in height, as the pantograph trolley automatically adjusts itself to the position of the trolley wire. In some cases the wire has a normal height of 22 ft., but is carried under bridges where the limit is 15½ ft.

The three types of railway motors and the three respective systems for conveying power from the generating station to the locomotives have all successfully demonstrated their ability to operate railway trains.

#### REQUISITES FOR A UNIVERSAL ELECTRIC SYSTEM.

In selecting a proper electrical system for railway operation it will probably be generally conceded that the following elements are of prime importance:

a The electric locomotives should be capable of performing the same kinds of service which the steam locomotives now perform. This will be most readily secured by electric loco-

tives which can practically duplicate the steam locomotives in speed and power characteristics. This includes a wide range of performance, embracing through passenger service at different schedule speeds; local passenger service; through freight service in heavy trains; the handling of local freight by short trains, and a variety of switching, terminal and transfer movements. This naturally calls for wide variation in tractive effort and in speed, both for the operation of different kinds of trains, and also for the operation of the same train under the varying conditions usually incident to railway service.

b The electric locomotive should be capable of exceeding the steam locomotive in its power capacity. It should be able to handle heavier trains and loads, to operate at higher speeds, and in general to exceed the ordinary limits of the steam locomotive in these regards. The readiness with which several electric locomotives can be operated as a single unit enables any amount of power to be applied to a train.

c The electric system should adapt itself to requirements beyond the ordinary limitations of the steam locomotive in small as well as large things. It should be adapted for use on branch lines, and for light passenger and freight service similar to that so profitably conducted by interurban electric roads, which in many cases run parallel to steam roads, not only taking away the traffic of the steam roads, but building up a new and highly profitable traffic, both in passenger and in express service.

d A universal electric system requires that power should be transmitted economically over long distances and supplied to the contact conductor. The system should utilize the most highly perfected apparatus for the electric transmission of energy and its transformation into suitable pressures for use.

e The contact conductor in an ideal system should be economical to construct, both for the heaviest locomotives where the traffic is dense, and for light service on branch lines. It should impose minimum inconvenience to track maintenance; should give minimum probability of disarrangement in case of derailment, or in case of snow and sleet, and should in general be so placed and constructed as to give a maximum assurance of continuity of service.

The use now made of electricity in steam railway service has been brought about, generally speaking, through compulsion. The steam locomotive has reached its limitations and has been found unsuitable and inadequate in tunnels or in terminal service. Even where other considerations may have been controlling, the problem has usually been a specific one of electrifying a relatively small area. The problem has been solved by considering those factors which were of immediate importance, without giving weight to uniformity with other systems or of extension. Now, the natural course of development will be the extension of these limited zones, until after a time they meet. Then there will arise great inconvenience and expense if the systems are unlike. For the present it may be a matter of little moment whether different systems have their contact conductors in the same position, or whether the character of the current used is the same or different.

#### THE FUTURE OF ELECTRIFICATION OF RAILWAYS.

The complete electrification of a railway will necessitate a rearrangement of ideas and practices in regard to operations. Coaling and watering places will not be needed; passenger trains will be differently composed, some classes being of less weight; and they will operate more frequently, thus promoting travel; other trains will be heavier than at present, or will operate at higher speeds, and branch lines, by the use of electrically fitted cars, can be given a through service not now enjoyed. The movement of freight will undergo great changes, due to the fact that electric locomotives can be constructed with great excess capacity, enabling them to move longer trains at schedule speed on rising gradients. The large percentage of shunting operations due entirely to the use of steam locomotives will no longer be required. The railway companies can combine upon some co-operative plan for the generation of electricity, thereby effect-



ing large savings in capital expenditures, and can utilize their own rights of way for the transmission of the current, not only for the operation of trains but for many other useful purposes. I foresee from the progress made in the development of gas and oil engine power a still further reduction in cost, which will accelerate the work of electrifying existing railways. One important aspect of this great question will engage thoughtful consideration of every government, namely, the military necessity for uniform railway equipment in time of war.

Were there now only one system to be considered, there would be a concentration of the energy of thousands on the perfecting and simplifying of the apparatus for that system, to the advantage of railway companies and of manufacturers. In conclusion, I can only repeat, and earnestly recommend to the serious consideration of railway engineers and those in authority, the pressing need of determining the system which admits of the largest extension of railway electrification and of a prompt selection of those standards of electrification which will render possible a complete interchange of traffic in order to save expense in the future and to avoid difficulties and delays certain to arise unless some common understanding is arrived at very shortly.

#### HINE UNIT SYSTEM EXTENDED TO UNION PACIFIC GENERAL OFFICES.

The Hine unit system of organization has been extended to the general offices of the Union Pacific at Omaha, Neb. A circular issued by A. L. Mohler, vice-president and general manager, and approved by J. Kruttschnitt, director of maintenance and operation, under date of July 1, announced the appointment of the following assistant general managers: 1, Charles Ware, formerly general superintendent; 2, C. E. Fuller, formerly superintendent of motive power and machinery; 3, R. L. Huntley, formerly chief engineer; 4, W. D. Lincoln, formerly superintendent of transportation; 5, T. M. Orr, formerly assistant to the general manager. The circular says:

"Each of the above-named officials continues charged with the responsibilities heretofore devolving upon him, and in addition assumes such other duties as may from time to time be assigned. The titles general superintendent, superintendent of motive power and machinery, chief engineer and superintendent of transportation will be retained by the present holders or their successors to such extent only as may be necessary for a proper compliance with laws and existing contracts."

The system as adopted in the general offices will be similar to that already adopted on all but two divisions of the Union Pacific, the Wyoming and the Utah. The Hine system and its purposes were quite fully outlined in an editorial in the *Railway Age Gazette* of January 22, 1909, p. 150, when its initial installation was made on the Nebraska division of the Union Pacific. Major Charles Hine, its originator, subsequently read a paper on the subject before the Western Railway Club, which was published in the *Railway Age Gazette* of January 21, 1910, p. 134. Those interested in the subject will be able to get a pretty clear idea of both the letter and the spirit of this system by reading these articles.

When it was adopted on the Nebraska division it was regarded by the management as an experiment. It has worked out so satisfactorily that, as already mentioned, it has been extended to all divisions except two, and will be extended to them as soon as details can be arranged. It has also been extended to most of the divisions of the other Harriman lines. Its adoption in the general offices of the Union Pacific indicates that it has become the fixed policy of this road. It should, perhaps, be added that it cannot be carried out in quite all of its details in the Omaha general offices at present, as the office of Mr. Fuller is now at the Omaha shops, and will probably remain there until the new Union Pacific office building which is being erected at Omaha is finished. The general manager and the assistant general managers will then have their offices together, as the superintendent and the various assistant super-

intendents of each division now have their offices together. It will be noted that the general officers who have been made assistant general managers, like the divisional officers who have been made assistant superintendents, continue charged with the duties of the offices they previously held—those of the engineering and motive power and transportation departments—and at the same time have authority over all departments.

With this extension of the unit system on a road such as the Union Pacific, which is not divided into districts, there will be but four grades of operating officers, namely: General manager, assistant general managers, superintendent and assistant superintendents. When the system is perfected on roads such as the Harriman lines in Louisiana and Texas, which are divided into districts, there will be on those lines six grades of operating officers, namely: General manager, assistant general managers, general superintendent, assistant general superintendents, superintendent and assistant superintendents. It is understood that the system, which is already in satisfactory operation in the general offices of the Oregon & Washington at Seattle, will shortly be extended to other general offices of the Harriman lines.

That the unit system is the best operating organization the managements of the Harriman lines are pretty thoroughly convinced, after having given it more than a year's trial. Officers of numerous roads have visited these lines to study its workings; some "who came to scoff remained to pray"; that is, they started their inquiry with an impression of the system formed from reading the necessarily skeleton-like outlines of it which have been published and got a very different impression of it when they came in contact with the *spirit* in which it is being carried out. Like any other organization, the way it works depends more on the unwritten than on the written law. It is an interesting development of railway organization which will be studied by the officers of other roads with even more interest, now that it has been extended to the general offices, than it has been in the past.

#### RAILWAY TELEGRAPH SUPERINTENDENTS.

The twenty-ninth annual convention of the Association of Railway Telegraph Superintendents was held at Los Angeles, Cal., June 20-25. It was largely attended, and most of the leading railways of the country were represented. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles & Salt Lake and vice-president of the association, called the meeting to order, and Joseph Scott, president of the Los Angeles Chamber of Commerce, extended the freedom of the city to the visitors. F. H. Van Etten, of Chicago, in the absence of Secretary P. W. Drew, was elected secretary pro tem.

On account of the resignation of J. L. Davis, president of the association, some two months ago when he severed his relations with the railway telegraph service, George A. Cellar, of Pittsburgh, and John B. Sheldon, of Omaha, were added to the executive committee. There are now 116 active and 63 associate members in the association, making a total of 179.

On Tuesday E. P. Griffith, for the committee appointed in March, reported on a system for delivering messages to passengers on trains. The committee conferred with A. G. Saylor, general superintendent of the Western Union Telegraph Company, and M. M. Davies, electrical engineer of the Postal Telegraph Company. It was found that the methods of making deliveries to passengers on trains varied considerably, and that a large percentage of the telegrams of that character failed of delivery. In 1905 the Pennsylvania Lines, west of Pittsburgh, issued a general order instructing agents, conductors and employees generally to co-operate to make deliveries. If railways will do no more than adopt the Pennsylvania Lines' order great progress will be made; but this association may go further in the matter, by recommending to the General Passenger Agents' Association, to instruct agents to aid the telegraph company's messenger to reach the conductor and instruct the conductor to receipt for

messages addressed to his train, or in his care. In case the conductor be unable to find the addressee on his train; he can note on the envelope "Unable to find addressee," etc., and return it to the agent of the station where the message was delivered. The telegraph company's receiving office should place full address on the envelope as a guide to the conductors in returning undelivered message to the proper station. The old method of having the telegraph company's messenger page the trains, while stopping at a station, is unreliable. At stations where a stop of five minutes or more is scheduled passengers take advantage of the stop to exercise themselves on the platform, while the messenger is passing through the train.

The Pennsylvania order referred to says that the messenger should be permitted to pass through the train if the stop be of sufficient duration; but direct delivery to the conductor of the train eliminates the danger to the messenger and releases the railway company from liability of injury to such messenger. A committee of five was appointed to formulate a plan. This committee consists of E. P. Griffith, C. L. Lewis, W. J. Camp, William Bennett and J. C. Johnson.

After an inspection of the exhibits, M. E. Launbrauch read a paper on "protecting telephone lines from lightning and other disturbances."

On Wednesday morning the meeting listened to a paper on "Education for Efficiency in Railroad Service," by D. C. Buell, describing the educational department of the Union Pacific. F. D. Mackay, manager of the Southern Pacific school of shorthand and telegraph operating, said that the school received the co-operation of the S. P. Out of 347 examinations for efficiency to accept positions since the school was established 300 were accepted and 47 rejected. Over 100 graduates of the telegraph department have been employed by the Southern Pacific. A paper on "Wireless Telegraph as Applied to Railroad Lines" was read by Dr. Lee De Forest. The first experiments on moving trains were made on the Chicago & Alton in 1905. Last year the Fred Thompson Theatrical Special "Via Wireless" train from New York to Chicago was equipped with a telegraph transmitter and several trackside wireless stations installed for the purpose of keeping in touch with this train throughout its journey. These tests, it is understood, were successful. Dr. De Forest said that the wireless waves acted strongly only on special detectors, like the crystal silicon, the "audion" and the like. If necessary choke coils, without iron cores, can be inserted in the wires outside of stations to effectually prevent the electric waves from entering the wire telephone and telegraph instruments.

Further notice of Dr. De Forest's paper, as well as those of Messrs. Launbrauch and Buell, must be deferred to a future issue.

Mr. Griffith, superintendent of telegraph of the Erie, calling attention to the report that the first railway station at Turner, N. Y., has been or is soon to be demolished, and, quoting from the history of the Erie Railroad, the statement that the first telegraphic train order ever sent was despatched from that station by Charles Minot in the autumn of 1851, offered a resolution that the telegraph superintendents, in conjunction with the Old-time Telegraphers' and Historical Association, appoint a joint committee to raise a fund to erect a suitable monument at Turner to commemorate that event. The resolution was adopted and a committee of five was appointed to take charge of the matter, namely: E. P. Griffith, of New York; Charles Selden, of Baltimore; W. J. Camp, of Montreal; E. A. Chenery, of St. Louis, and J. B. Taltavall, of New York.

W. F. Williams, superintendent of telegraph of the Seaboard Air Line, gave an account of his successful experience during the past four years in block signaling by telephone on a single iron wire which has been up 40 years. The wire is "composited" and it is still used for long-distance telegraphing. No station has occasion to telephone a long distance and all block-ing operations are carried on without telephoning through any telegraph relay. These operations extend over 154 miles of line.

On Thursday evening, after a delightful trip over the kite-shaped track of the Santa Fe, which consumed the entire day, the meeting discussed high tension crossings. William Bennett, speaking for the chairman of the committee, outlined the position of the association and explained the proposed specifications for a safe crossing. Among those taking part in the discussion were: Messrs. Camp, Gilkyson, Davis, De Forest and Groce.

Boston, Mass., was selected as the place for the next meeting and the date will be June 19-23, 1911. The following officers were elected for the ensuing year: President, I. T. Dyer, Los Angeles; first vice-president, John B. Sheldon, Omaha; second vice-president, William Bennett, Chicago; secretary and treasurer, P. W. Drew, Chicago.

During the three days that the members of the association were in Los Angeles their spare time was completely filled up with tours and excursions, and the ladies were entertained with automobile rides. Among the hosts were the Los Angeles Pacific Railway, the Pacific Electric Railway, the Atchison, Topeka & Santa Fe and the San Pedro, Los Angeles & Salt Lake. After the ride on a special train on the San Pedro line, a trip was made by the steamer Cabrillo to Catalina Island.

#### COSTLY GOVERNMENT RAILWAYS.

Count Witte, formerly Prime Minister of Russia, but who first distinguished himself as a railway man, has recently lectured before the Russian Institute of Transportation Engineers on the cause of the deficits of the Russian railways. It was Witte himself who, shortly after the last war with Turkey, converted a large part of the corporation railways into the state system. This, he says, was unavoidable. The Russian lines had wholly failed when the army was to be mobilized. It must be remembered that interest on the capital of these lines was guaranteed by the state, and in 1886 these guarantees on the comparatively small mileage then existing, cost the state about \$32,000,000. When the lines came into the hands of the state the deficits were rapidly reduced, becoming only \$2,000,000 in 1894, and then for five years disappearing entirely. But beginning with 1900 there was again a deficit of \$1,300,000, and this has increased with frightful rapidity, and in 1907 reached \$60,000,000, an average of about \$1,500 per mile of road.

The cause of this has been, so Witte says, the construction of new lines not for economic, but for strategic purposes while even so they failed the strategic purposes for which they were planned. If the army could have been moved to the east of Lake Baikal twice as quickly the result of the war with Japan probably would have been different, and that war cost \$1,500,000,000, which is two-thirds of the cost of the whole state railway system. On the western border also lines have been located especially with reference to assembling the army on that frontier, and the result is, that the army can be massed there *two weeks after* the countries on that side would have massed their armies there, with results easy to imagine. The latest and worst of these strategic lines, he says, is the railway down the Amoor, which is sure to increase the deficit for years to come.

Again, the efforts of the authorities have aimed rather at improving transportation than at making it profitable; and, especially, rates were established on a uniform scale for the whole of the vast empire, and so low as to be profitable only where traffic is heavy; and when attempts have been made to make them more profitable, this has again been done by a general advance, which in some cases tends to destroy traffic.

On the Prussian-Hessian state railways there are now 1,100 miles operated with electric accumulator cars and this will shortly be increased to about 1,550 miles, with a total of 100 cars. These cars are capable of running 60 miles without being recharged and at a speed of 30 miles per hour. The batteries consist of 168 elements weighing 43 lbs. each.



## MECHANICAL TRANSFERENCE OF WATER-BORNE FREIGHT.

BY H. M'L. HARDING,  
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Before adapting machinery to the handling of water-borne package or miscellaneous cargo freight, it is essential to understand all the details of the methods now employed at steamship terminals. Knowing these, we can comprehend what would be the requirements to be fulfilled by any mechanical appliances which could successfully replace man's muscle and the ancient hand truck. Not thoroughly realizing, from the pier superintendent's standpoint, the work to be done, may be the reason that more installations have not been made. The local superintendent must have certainty and a positive sureness of freight movements, and an ample reserve capacity for any unexpected rush of freight. For the above operation he is responsible, more so than for electrical and mechanical devices. This is his position and this should be kept in view.

It is difficult to understand why so little information and so few descriptions have been given as to the everyday working movements in handling cargo freight upon piers and bulkheads. It is more complex than it appears. The assorting and distribution without errors require no little care and supervision. From the great carriers, with their enormous capacity, pours forth such a flood of merchandise that the floors of the larger piers will scarcely hold it. Larger vessels are being built and more frequent trips are made, which call for a quicker clearing of the floors than ever before. This means intensity of service.

There is a marked difference in operation in handling railway and steamship freight, but as most railway companies control steamship lines, any improvement in water terminals should be of equal interest to them.

There are two important reasons for changing from the two-wheeled truck and man power to machinery. These are: Congestion, lack of capacity—that is, crowded floor space—and the increasing expense per ton handled. These causes are interrelated; congestion reduces the efficiency and so augments the expense.

If the tonnage of freight to be handled in a certain time falls below a certain figure, the expense per ton handled increases. If the tonnage rises above another fixed higher figure, the cost again rises. The former cause is due to the fixed charges; the latter to congestion, strikes and the difficulties due to man-labor. The above rule, however, does not apply when the machine takes the place of man.

The cost of handling freight at water terminals has increased because of rise in the cost of labor, greater rent, the larger investment for piers and sheds, etc. Another cause, not so well understood, is due to the larger number of marks and cross-marks, which add to the length of the truck travel. On some piers in New York more than 4,000 tons of coastwise freight are cared for every 24 hours of the day, except Sunday; that is, averaging 2,000 inward and 2,000 outward on the same pier.

A liner's manifest, to a greater degree than those of other ships, has many curious hieroglyphics called marks and cross-marks, designating the different consignees. A large tonnage of freight in one shipment is imported under one chief mark, name or figure upon the packages or cases. The importer using this chief mark may be a wholesale merchant. This consignment before shipment may have been sold to smaller dealers, or the smaller dealers may have combined under one main mark.

The ordinary way would be for the wholesaler to cart the goods to his warehouse and there assort for the retailers. Instead of this method, on many cases there are sub or cross-marks, indicating the small dealers, and the steamship company assort the consignment according to the cross-marks in

separate piles on the pier floor ready for the draymen. There are often several thousand marks and cross-marks in one steamship's cargo, and by the law of some states there must be a separate pile for each. These separate piles require greater floor space, hence larger piers and much longer truck travel. The number of marks and cross-marks seems to be increasing, as more raw material, at its place of origin, is converted into manufactured products.

While the liner has many hatches for receiving and delivering cargoes, the coastwise steamship and river boats have side ports as well as hatches. This condition must be considered.

A large consignment is often tiered by manual labor, but if it piles above 5 or 6 ft. in height, it is more expensive than long trucking. On account of limited floor space, tiering, though so expensive, is often necessary.

Some pier sheds are now 800 and 1,000 or more feet long and 150 ft. wide. It is a customary sight, as soon as the steamship is unloaded, to see the whole floor covered with piles of this cross-mark freight, leaving a little space for ingress and egress of drays. On account of the method of loading at foreign ports, the different consignments being stowed together, there may be several cross-marks coming from the hold in one sling load.

The following description will now help to make plain the system of transferring by hand truck:

For unloading miscellaneous freight, stationary platforms are usually placed at the entrances of the pier doors, partly within them and partly without, and on these is swung the cargo freight, whether miscellaneous boxes, barrels, packages of every kind, bags of coffee, sugar or similar material. At some piers the freight is unloaded from the ships on the floor, but the platform is better, as it saves lifting. This miscellaneous cargo freight, as soon as the slings or nets are loosened from the hoisting rope hooks, is pulled over the platform on one or more hand trucks, which are backed up to the platforms. The packages are arranged with the manifest marks or cross-marks uppermost, for delivery to sections of the pier designated by letters or numbers. A copy of the manifest is given to the pier superintendent and he arranges these sections on the pier floor according to the manifest.

As soon as the truckman receives a load from the platform he starts off, being directed according to the marks, to the section designated on the pier floor or wall. At various intervals men are stationed to show these hand truckmen where to go. If the hand truckman has, say, four packages, and these are all for one consignee, he has only one place to which to truck. But the packages may be for four different consignees. One consignee might be 400 ft. to the left of the door and another consignee 400 ft. to the right.

The hand truckman does not generally depend upon his own intelligence to find the right floor section, but on the platform man and the men on the floor, who may be called routing or direction men. A man is at each pile to receive the load from the truckmen and to check against any mistakes. If there is any tiering, there are two or even four men at each pile to lift the load from the truck to the pile. The truckman rarely tiers. The assorting is in reality done at the different consignees' sections. The truckman therefore takes a number of packages, unless too heavy, and delivers them one or more at the different places.

To illustrate the number of men employed in one movement, for one consignee, the following is from actual observation: Six medium sized boxes containing mineral water were swung by the ship's winch over the vessel's side to the pier floor, where it was received by three men. As soon as the truckman appeared he wheeled his truck to the door and waited. One man unloosed the sling, the other two men lifted one box at a time and placed it on the truck. As soon as three boxes were loaded the truckman started towards the end of the pier. At the first turn a man directed him, 200

ft. further another man hurried him along and several more assisted him, expending 800 or more foot-pounds of energy in the vigorous, virile language of the longshoremen. When the truckman arrived at the proper pile, 600 ft. away, he backed up his truck, two men on the floor raised one box at a time from the truck to two other men a little higher, who passed it to two others, who finally placed it on the top of the pile 8 ft. high. The same process was repeated for the other two boxes. Another truckman with three more boxes was awaiting his turn. Eleven or twelve men expended muscular or verbal energy in the movement of these three boxes.

As the truckman, including loading and unloading, even when moving fast, will not average over 125 ft. a minute, during the whole day from morning to night, it will seem how long a time it may take to deliver a few packages and the necessity for the employment of many men.

The chief reason why packages with different cross-marks are so often placed on the same hand truck is because of the loss of labor-time if the men waited for a full load for one consignee. Another is the limited space for the men and the trucks about the platforms. This class of labor generally receives 30 cents an hour for day and 45 cents for night labor.

Even as it is, owing to the irregular way in which the same cross-marks come from the ship's hold and to the location of the different consignees upon the pier floor, it often happens that at one time there is a long line of truckmen waiting at a platform and at another time the platform is full of packages waiting for the truckmen; this holds back the vessel's hoisting machinery and the men unloading in the hold of the vessel, as well as the deckmen. More packages cannot be placed on this platform until space is provided by the removal of the merchandise already there.

Owing to the necessity for speed, on some piers hundreds of longshoremen are employed and often 20 or 30 are waiting in line at one platform. The trucks with the men occupy much valuable space upon the pier floor, not only about the unloading platform, but for coming from and going to the platform.

The outward manifest from the United States is much the same as the inward, except there is not the variety of packages. These packages are brought from the consignors by drays or by barges and lighters, and, as far as possible, are piled on the piers in some order. There is not, however, the same necessity of keeping them separated. Should the vessel be alongside the pier, lighterage freight is often loaded directly from the lighter to the ship.

This outgoing freight is, however, measured as received, and later trucked to the nearest loading door, placed in nets or slings and hoisted over the ship's side into the hold. Ordinary outbound freight is not weighed, but measured, 40 cu. ft. being equal to a ton. Heavy material, such as metals, are weighed, except where it is transfer freight from other lines or where the weights are well known.

There are many types of electric overhead conveyors which can hoist and convey steamship freight of every kind, size and weight from any place on the pier and place it at any other place without rehandling. By the electric overhead traveling cranes seen in every machine shop this can be done slowly with a very limited degree of efficiency. These shop cranes are not adapted to the quick movements of the many cargo packages, which should follow each other so quickly as to be almost continuous.

In English and German ports, wherever freight is to be handled, even though the tonnage is small, there are elevated gantry cranes, as at Hamburg and Liverpool, or the roof cranes at Bristol, or even a traveling crane at the smaller towns. These cranes are everywhere in evidence, from the thousand cranes at or near Hamburg to one crane at a small port of call. France has floating cranes; Rotterdam has barges equipped with hoisting machinery.

These jib-gantry cranes do only part of the work. Their

range of movement with load is not over 100 ft., of which 50 ft. is inside the pier line, and though they can cover the nearby cars and platforms they cannot serve the length and breadth of the large warehouses to the rear of the platforms, which at most American ports is the chief labor expense.

Telpherage has been used most successfully in hoisting and conveying raw and manufactured material, as well as miscellaneous freight of every kind, weight and size, and for serving even remote space, without rehandling, when it is directly beneath the overhead tracks. There are at least 50 manufacturers of telfers in Europe, and overhead electric travelers, transporters or telfers are in use in most of the important industrial works, handling almost every kind of freight which later makes up the steamship's cargo. This is not only conveyed about the works, but is transferred between the different stories or between the upper stories and the ground.

Any objections by transportation companies to extending the range of mechanical conveying so as to serve every square foot of space of the pier shed or warehouse has been due to not knowing or comprehending what advances have been made in terminal transportation during the last few years. They consist not in the development of new machinery but in a combination of the shop crane, to which are attached movable tracks, with fixed tracks, switches and loops and the overhead electric conveyors or telfers. These form parts of the most advanced system.

Among the questions which naturally arise in the mind of the practical operating pier superintendent are:

The first and always the question, Can machinery do the work of the hand truck? Can man power be replaced by electricity? Can the inbound freight be assorted, distributed and placed anywhere, without rehandling, on any and every square foot of the pier shed and tiered in high piles for each consignee according to the marks and cross-marks? Can the cargo be moved by machinery away from the doors of the pier sheds as fast as it swung over the side of a liner equipped with the most rapid hoisting machinery for unloading, such as winches, hydraulic and steam hoists? Can there be achieved a greater rapidity and efficiency in all freight movements to the most remote portions of the pier sheds? Can provision be made for the yearly increase of freight without new installations? Can there be a transference of the freight equally well in both directions without interference and rehandling, including the movement of both the outbound and inbound freight? If desired, can mechanical devices with extended movable and adjustable loop tracks take freight directly from the liner's hold, from the side port of the coastwise and river steamers, from floats, barges and lighters, to and from any portion of the pier?

As previously stated, the whole tenor of the questions of the pier superintendent is not the engineering details of the design and construction of the machinery, but positive quick operation, which must not only be able to duplicate exactly existing methods, but give greater capacity in the same pier shed and also freedom from mistakes in assorting.

Let us now compare the hand-truck methods with the mechanical, step by step, in each detail of operation; first with special reference to the unloading of the ocean liner. The freight is swung from the vessel, either to the floor or to a platform, in the same manner as when hand trucks are used. This platform, which is movable, is placed a short distance above the floor, inclined and depressed slightly towards the inner side so that the inward freight can be moved with the least resistance. It has a width of 3 or 4 ft. and can be made rectangular or circular, preferably the latter.

The object of this platform is for the quick assorting for the different piles. When the freight has been deposited on this platform it can be separated and pulled on flatboards, slings or nets, which are placed on the floor near the inside edge of this platform. These flatboards are only 2 or 3 in. thick, so that they can be placed upon one another, as many as three or four in one pile. Instead of these flatboards, rope canvas slings or nets can be similarly placed.

When there is one large case, or a number of boxes or pack-



ages known to be for one consignee, it will not be necessary for these to be placed on the platform or floor, but the hook of the overhead electric carrier hoist can be inserted in the ship's sling and the load conveyed directly by the overhead carrier, after releasing the ship's hook. This transferring of hooks is common practice in the loading and unloading cargo freight. The slings or nets may have two small rope loops to facilitate quick changes. Any pier superintendent will appreciate the great advantage of changing hooks and, without any rehandling or even touching the packages, conveying the load in the original net or sling to any portion of the pier and depositing it, this conveying being done at a speed of 700 to 1,000 ft. per minute. And in addition, provision, as above, has been made for assorting and distributing other sling loads according to the different cross-marks.

For the transference of cargo, to and from the ship in connection with the mechanism, there are employed slings, nets, flatboards, nets with flatboards or boxes in them, and flatboards with a few inches of side boards and then nets attached to the sides or ends. The side and end nets thus attached are to prevent smaller packages from falling out. A sling consists of a closed loop of manila or wire rope. It is single or double. In some cases it is of two or more single ropes with rings at the ends. Often two separate loops are joined together. By releasing one end of the loop the load is released. These slings are inexpensive. A canvas sling consists of strong canvas sewed around the middle of each sling rope. Nets are made of manila or wire rope, of chain or of a combination of rope and chain. The bridle is often of manila rope for ease of handling, while the center may be of chain. There are four, six or eight lifting ropes suspending the nets. By releasing half of these from the hook the load is as easily dumped as with slings.

Suppose that there are, in the sling, packages with six or more cross-marks. There would be eight or more slings, nets or flatboards arranged about the platform. As soon as the loaded ship's sling is lowered to the platform and loosed, one or several packages are drawn upon each flatboard or sling. If there is no likelihood of other packages coming immediately for the same consignees, the loads are hoisted and conveyed to the sections of the floor which are marked for these consignees. It should be noticed that the movement is vertical and not along the floor, as with the hand truck, so no floor space is used in the conveying movement.

If desired, when assorting, each flatboard can be held for a full load if there is a possibility that the following slings may contain additional packages for any of the same consignees whose flatboards are partially loaded. It is, however, not necessary to hold any slings or flatboards for greater loads, as most of the movement is automatic. The load is raised and started by the door man or telfermer closing a switch.

The door or side wall of the pier shed is marked with letters or numbers for each consignee. As soon as a flatboard has a full or even a partial load as above, the marks being known and designated, it is carried by the overhead electric carrier to the proper lettered or numbered section of the pier, as at present by the hand truck. A number of two-wheeled electric carriers, having electric hoists suspended from them, are placed above the edge of each platform on the elevated conveying track, just beneath the cross girders of the pier-shed. As soon as a flatboard is ready, it is raised and carried around the circuit and each load left at its proper place. A combination of automatic or non-automatic telfers will in most cases be the most efficient. The greater portion of the cargo will often consist of many tons in each consignment. These will be piled together. The slings and flatboards can therefore transport full loads weighing many times the capacity of man power and move over the floor at a much faster speed.

As soon as the carrier, marked by a plainly visible number or letter attached to the carrier, arrives at the corresponding floor section, the load is lowered upon the floor or pile, being

tiered. Tiering costs no more than placing on the floor. This lowering and unloading is done either by the telfermer or by a man upon the floor who has charge of that section of the pier.

When the freight is tiered on the pier from barges before the arrival of the steamer and must be again moved in loading the steamer, it is often advisable to leave the slings or flatboards in the pile so that the load can be raised as it is, without any rehandling. As freight can be raised or lowered over every square foot of space upon the pier, the overhead hoist would enable loads to be taken to and from drays standing on any portion of the pier floor and moved to any other; in fact, drays could be unloaded outside in front of the pier and the loads carried into the shed or even to the ship's winch or to the hold itself as soon as measured. This would prevent the congestion of many teams upon the pier waiting to be unloaded or loaded.

It can now be seen whether the superintendent's questions have been answered. By overhead conveyor hoists or telfers, loads of every description, weight and size are being moved daily with the greatest rapidity and certainty. These conveyors can raise and convey a loaded hand-truck as well as a flatboard, sling or net. By means of the movable cross track every square foot of pier floor space can be served. These movable cross tracks with switches eliminate the labor of rehandling, and duplicate the movement of the hand-truck, serving all parts of the pier. These telfers can follow each other so closely that the service is almost continuous. The further mechanical details are described in other papers. The description of the way the cargo is received, conveyed and tiered shows that machinery can be adapted to any of the described branches of this transportation problem.

Machinery will travel six times as fast as man, and easily carry eight or more times the load. The many electric carriers, therefore, will move the loads at such a speed from the pier doors that more rapid methods of unloading from the hold and swinging over the ship's side than at present will soon be necessary. The most remote portions of the pier can be served inexpensively, due to the quick action of the electric conveyors. Reserve conveyors and hoists are provided for a rush of freight.

Many superintendents seem to prefer the ships' winches and hoists. On this account special attention has been given to the work in the pier shed. The loads, however, can be hoisted from the deck-hatches, from side ports or lighters and conveyed equally well and as directly as on the pier. The assorting would be on elevated platforms. It is only necessary to extend straight tracks or loops out over the water upon which the electric telfers can travel. The loops or tracks have both a horizontal and vertical movement to serve all the hatches and to avoid interference with the vessel's rigging. The extended tracks can support a temporary roof to protect the cargo from the elements. The rise and fall of the tide does not interfere with the operation of overhead conveying, it only causing a few feet more or less of hoisting.

Where the unloading is from the side ports of coastwise steamers or river boats, it is not necessary for the load to be first placed upon the pier before hoisting, but it is raised directly from the side of the ports. The assorting would not in this case be done at the pier doors, but at convenient locations away from the doors, thus facilitating the transfer. The slings or flatboards would be loaded from all four sides of this space, giving freer movement than at the pier doors. Barge freight can be unloaded and conveyed directly to the steamship or tiered on the pier with slings left around the loads, so that later the load can be taken to the steamship without any rehandling. The same facility can be observed in the reverse movement to the barges or lighters from the steamship or pier.

In providing for the yearly increase of this miscellaneous

freight, it is only necessary to provide more electric carrier hoists, no changes being necessary in the first installation, equipment or tracks. All movements are in the same direction as the hands of a watch, therefore there can be no interference in the movements of the carriers, whether handling the inward or outward cargoes; nor would there be any interference with present methods, either in installation or operation. In fact, the old and new methods could go on simultaneously.

It is of the greatest importance in designing new piers, pier sheds or warehouses to consider the future installation of mechanical appliances, even though it be not the intention to use machinery at the outset. If provision be made in the design itself for machinery, it will cost less for installation, and the buildings will be better adapted for operation. If the overhead trackage be placed in position at the same time the steel structure is erected, it will cost less than later.

While the outward foreign freight is measured, much of the inward must be weighed on account of custom duties. The weight of all outward coastwise freight must be known to determine the transportation charges. Provision is made for the quick weighing of each when the carrier passes over a section of the overhead track which is connected with scales.

The total cost of an installation, when recommended, should show a net saving on the investment of at least 25 per cent. per year. This is after deducting interest, maintenance and amortization. Finally, these are the principles upon which this success depends: The electric hoist eliminates the great expense and difficulty of vertical movements; the electric conveyor annihilates time and excessive cost in horizontal traveling; these two combined form the telfer, enabling long lines to be covered; the movable cross tracks and connecting switches enable areas as well as lines to be equally well served. These tracks and machinery, being all overhead, occupy space not now available.

#### THE A B C RULES ON THE NORTHERN PACIFIC.

At the convention of the Train Despatchers' Association in Spokane, June 22, Alfred Beamer, originator of the A B C rules for train despatching, gave an account of his experience in the operation of these rules. Prefacing his remarks by observing that the rules were the outcome of the lessons which he had learned in an experience of thirty years in the operating department, and the conviction that the ordinary train despatching rules are wrong in principle, Mr. Beamer said:

It is easy for a superintendent to ask Conductor Jones why he did not protect his train by flagging as per rule 99, but it is hard for Jones, who is trying to save as much of his job as he can, to tell the superintendent that if he complied literally with rule 99 in every instance he would not get his train over the road in a week; but the superintendent knows it, just the same; and he knows further that the matter of taking chances on the flagging rule is of hourly occurrence. But the rule, like other rules, proves that the company has done its duty in showing the men what should be done under certain conditions and that the men, not the company, is at fault. But is this a fact? Is it not true that our rules are simply a record of accidents that have happened?

Is it not true that when investigation of an accident develops a condition not provided for in the book of rules, we adopt the line of least resistance and immediately insert therein a rule that will cover such condition, thereby throwing the responsibility upon the men already overburdened with a mass of instructions?

Is it not better to recognize our responsibilities and the conditions that we know to exist, be the condition right or wrong? Instead of contenting ourselves with shifting the burden, why not assume it by trying to formulate a method that will not be so exacting? It can and has been done on 700 miles of the main line of the Northern Pacific, where the A B C system of operation has been in effect nearly two years. On the

speaker's division the wrecker has not been out to clear either a head or rear end collision in that length of time, a record seldom made with 188 miles of single track, carrying from twenty to thirty trains in both directions daily.

Much of the success that has attended its introduction is due to the attitude of the men toward it. With very few exceptions they view it as a great assistance in doing their work, simplifying the train movement and relieving train and engine men of nearly all of the burdensome rules and orders under which they formerly worked, simplifying the work of the operator and confining it to the two blocks, one on either side of him; and, last and best, making the train despatcher all that the name implies; a train despatcher in reality, with complete control of the movement of every train on his district, unhampered by rules conferring right by class and direction, time card rights and all the special rules heretofore thought necessary for the movement of business, many of them possible of wrongful interpretation. The despatcher has a modern arrangement of train slips for use in recording the movement of trains, and the cumbersome train sheet and train order books, are done away with. It is possible for despatchers to make a transfer from one to the other simply by noting the time the transfer is made. That the employees generally appreciate the changed conditions under this system was recently evidenced when delegates from the Brotherhood of Locomotive Engineers in A B C territory were instructed to bring the matter before the annual convention of that body at Detroit, Mich., this month. After explaining the operation of the system they urged the members to work for its extension on other lines. When the men on the locomotive, who have more at stake than any other person concerned in train operation, take such action voluntarily it certainly must mean that in their opinion at least it is an improvement over the old method. The delegates did as they were instructed and presented the subject to the Grand Lodge of the Brotherhood of Locomotive Engineers; and the Grand Lodge appointed a committee to investigate the matter and review the testimony given in behalf of the system by the delegates. Following this action the convention unanimously indorsed the system and made it a matter of record in its proceedings.

#### LOW CARBON STREAKS IN OPEN HEARTH RAILS.\*

BY M. H. WICKHORST,†

During 1908 and 1909, the Chicago, Burlington & Quincy obtained some open hearth rails which developed a peculiar kind of failure, the study of which proved very interesting. The nature of the failure caused considerable alarm at first, but the remedy was easily applied after the cause was determined. The failures consisted of the rails splitting through the head in various directions, through the web vertically or diagonally, vertically from the head to the base, and in other ways. As part of the investigation, the rails were examined by cutting sections from the defective portions, polishing highly and etching with picric acid solution in alcohol. The picric acid does not color the ferrite, or carbonless part of the steel structure, but the carbon bearing part of the steel is colored somewhat, in proportion to the content of carbon. Streaks of low carbon material are left with their full brightness.

Some typical etched sections of 90-lb. rails are shown herewith, and it will be noticed that the failures occurred along the streaks. The rails shown in Figs. 3 and 4 had light areas, big enough to allow getting samples for analysis, and the results obtained are shown in the following table:

	Fig. 3		Fig. 4	
	Normal.	White band.	Normal.	White streak.
Carbon .....	.69	.28	.78	.55
Phosphorus .....	.037	.091	.036	.073
Sulphur .....	.034	.048	.030	....
Manganese .....	.94	.64	.85	....
Silicon .....	.15	.09	....	.15

\*From a paper presented before the American Society for Testing Materials, June 29.

†Engineer of tests, Chicago, Burlington & Quincy, but recently granted a year's leave of absence to act as chief chemist in charge of rail tests for the Committee on Rails of the American Railway Engineering and Maintenance of Way Association.





Fig. 1.



Fig. 3.



Fig. 2.



Fig. 4.

Small white streaks examined under the microscope show a nucleus of slag, indicating that the slag in some way causes a reduction of the amount of carbon, and the rail shown in Fig. 4 also shows a large mass of non-metallic material contiguous to the white band; so it was at first thought that slag in the metal caused the white streaks by possibly oxidizing the carbon. This may perhaps be true of small streaks, but it was later learned that it was the practice at the mill that made the rails shown to put small soft bessemer steel plates on the stools of the molds to reduce the cutting out of the stools by the hot metal when it was poured into the molds. These plates, it seems, get churned up with the rest of the metal, melt partly or wholly, but before becoming thoroughly mixed with the main body of steel the metal sets, leaving streaks as shown in the figures. It had been thought that the first metal would set and hold the plate at the bottom of the ingot, where it would be sheared off, but as soon as it appeared that the plates caused streaks as shown the practice was promptly stopped. A few similar failures have been noted in rails from other mills, but whether due to a similar cause has not been determined.

#### THE TRAIN DESPATCHERS' CONVENTION.

The 23d convention of the Train Despatchers' Association of America opened at Spokane, Wash., on June 21, with an invocation from Rev. J. Elvin, pastor of the Pilgrim Congregational Church of Seattle. Mayor Pratt of Spokane welcomed the members of the convention, and was responded to by President Dellmin and Secretary Mackie. No business was done at the opening session.

At 1:30 p. m. the convention opened for business, the president making his annual address. Over 70 members were present and 23 new members were elected. A paper by S. H. Brown, of the Great Northern, Spokane, was read, and its discussion occupied the rest of the afternoon. The subject was "The Train Despatcher's Office: How It Should Be Equipped and Furnished."

The morning session of Wednesday was devoted to a paper by Alfred Beamer, late superintendent of the Northern Pacific, Spokane, on the A B C Rules. A telephone office had been opened in the convention hall, at which a despatcher, having before him the A B C record board and slips, copied, for the benefit of the members present, the various cards and other entries precisely as this is done in a dispatching office under these rules, while there were 10 or 12 telephone receivers at the service of members of the convention, enabling them to listen to the work being done. Mr. Beamer's paper was listened to with great interest, and inquiries as to practically all phases of the operation of the A B C rules were addressed to him at its conclusion, to all of which he replied in a perfectly clear and satisfactory manner, and the convention, by an overwhelming majority, adopted the following resolution:

*"Resolved, That this Convention of Train Despatchers, having heard the reading of the paper presented by our fellow member, Mr. Alfred Beamer, and the entirely satisfactory answers made by him and by despatchers who have worked under these rules to every objection raised, and having ourselves, in large measure, observed their operation, we desire to express ourselves as deeply impressed with the merits of these rules and recommend their use, which experience has shown to be eminently safe and effective in moving traffic, to all railroad companies as a substitute for the Standard Code, when conditions, such as the necessity for a block system, warrant their adoption."*

The form of the original resolution was different from the foregoing, and it was reconsidered during the last day of the convention, the modification here given being adopted by a large majority. Extracts from the paper are given elsewhere.

The convention adjourned at an early hour in the afternoon of Wednesday, without any recess for luncheon, in order to accept the hospitality of the Chamber of Commerce, which had provided an excursion through and around the city.

On the morning of Wednesday the report of the executive committee was taken up. It showed the income of the year to be \$2,799, an increase of \$246 over the previous year, and the expenses to be \$192 more than the previous year, a net gain of \$4 for the year, with a cash balance of \$615. The membership account showed a net decrease of 26 members during the year, the total membership at the close of the fiscal year being 938. A change in the publication of the "Train Dispatchers' Bulletin," the official organ of the association, was ordered, and hereafter the place of publication will be Chicago instead of Toledo. The president and the editor were empowered to make all arrangements.

An amendment to the constitution was adopted, permitting the admission to membership of train despatchers of interurban electric railways working under any approved system of train despatching.

Two papers by J. E. Scott, inspector of transportation of the Gulf, Colorado & Santa Fe, were read and discussed. One was on "Train Despatching by Telephone," as practised by the G., C. & S. F., the other on "Inconsistencies of Instruction in Train Rules." They were received with appreciative applause and ordered printed in the proceedings.

Mr. Scott's account of his experience with telephones has been similar to that of other despatchers, as heretofore published, but some parts of his narrative were particularly graphic. On his road the wires are so well managed that a despatcher realizes no difference in distance between the nearest station and that farthest from him. All hard and grinding work is done away with. The bells used at the stations are so large that an operator can do nothing else until he silences the bell. The despatchers write out the orders as they dictate them and there is practically no breaking to grate on the despatcher's nerves and use up time. Experienced telephone operators can repeat an order faster than the despatcher can underscore the words. The Atchison system will soon have 6,948 miles of telephone lines in use. The progress in the use of telephones for despatching has seemed surprising, and yet it should not be so, for are we not all familiar with the rapid deterioration of the telegraph service during the past few years? The despatcher who to-day has a set of good operators, is exceptional and is envied.

Mr. Scott's paper on faults in the methods of instructing trainmen and telegraphers evidently is the fruit of his experience as an examiner, and he points out he needs of this branch of the service with incisive accuracy. There is a noticeable absence of team work. General officers are too busy to attend to matters of instruction in detail, and subordinate officers often prove reluctant to adopt such a radical innovation. Differences of opinion, arguments and contentions concerning rules are so common as to be an element of danger, and the need of a uniform system of interpretation, examination and instruction is vital. In many cases, it has come about that employees no longer look for consistency either in the rules or in the officers. Differences between the views of different trainmasters are inevitable so that the establishment of a consistent policy for the whole of a railway is absolutely essential. Critics have sometimes said that satisfactory examination and instruction of trainmen is practically out of the question; but can this be true? The trouble must lie rather with the manner in which the system is handled than with the system itself. Two large railways, the Santa Fe and the Rock Island, already have thorough, uniform and systematic interpretation and instruction. This good result has been brought about by co-operation among the officers, high and low, and by energetic team work. The Santa Fe has for some years required a written, in addition to an oral examination, of trainmen and telegraphers. In the examination of conductors there are 600 questions, and of trainmen 603. No one who has tried both will fail to appreciate the superiority of a written over an oral examination. The oral questioning is entirely too elastic and too largely subject to the personal inclination of the examiner.



The report of the train rules committee was read and discussed. It proposed an additional example to Form C, for giving right to one extra over another; an additional example to Form G, for starting extras when an opposing extra has to be waited for; a form for use in starting trains from a point where a despatcher's clearance is necessary; recommended the new Rock Island rules for the movement of trains by telephone; substituted a new Rule 4 for that suggested a year ago; recommended that Form K orders be excepted from the operation of the principle that orders addressed to a train become void when the train ceases to exist; asserted the unsoundness of the practice of addressing train orders to "All concerned." They should, in preference, specify the trains or classes of trains addressed; also asserted the undesirability of using train order forms for slow orders, and recommending the "Pink Bulletin" of a separate form and color for this purpose; objected to requiring train despatchers to obtain acknowledgments of receipt of new time-tables by train order when general orders are also used for that purpose, as an unnecessary burden upon train despatchers; stated the desirability of furnishing a separate bulletin board in despatching offices for the use of despatchers alone; and recommended the substitution of other devices retainable by the operator for the usual hoop used in the delivery of "19" train orders. All of these recommendations were approved with the exception of some slight changes in the telephone rules. For delivering orders to moving trains the committee recommends in place of hoops a cord, which can be stretched over a frame so as to be easily taken by the engineman. The cord could be thrown away and the returning of hoops to stations would be done away with.

F. C. Dow (C., B. & Q.), Sheridan, Wyo., was elected president; J. B. Alvey (Illinois Central), Fulton, Ky., vice-president; J. F. Mackie (C., R. I. & P.), Chicago, re-elected secretary, treasurer and editor. The four members of the executive committee elected were B. S. Sperry and S. H. Brown (Great Northern), S. S. Conley (B. & O.), and T. W. Kane (Northern Pacific). The place selected for the next meeting was Baltimore, Md., and June 20, 1911, as the date.

The entertainment provided was exceptionally good, and the Spokane despatchers excelled themselves as hosts. The Inland Empire Co. gave an excursion on Wednesday night to Cœur d'Alene, with a trip by moonlight on the lake and a dance on the steamer. On Friday, the convention having finally adjourned, the Idaho & Northern gave an excursion from Spokane to Newport on the Pend d'Oreille river, with a three hours' steamer trip down the river to Ione, Idaho, the present terminus of this railway. There is a great wealth of timber along this line and fertile soil, out of which it grows, for the settler who will succeed the lumberman.

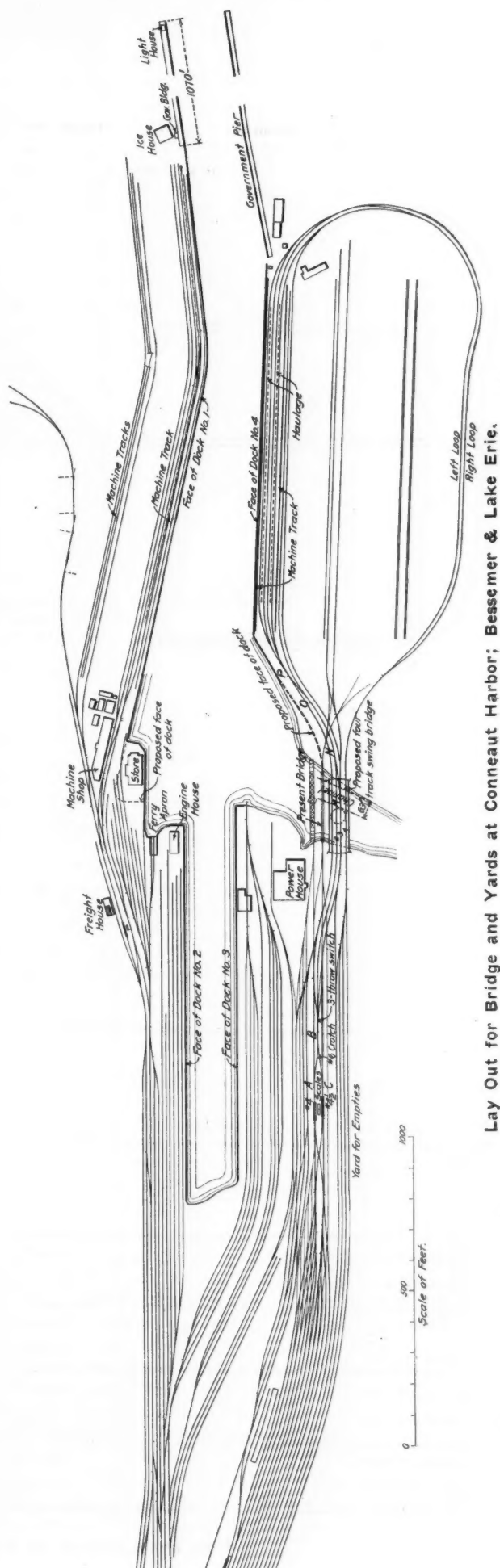
#### DOUBLE TRACK TRUSS BRIDGE WITH SUSPENDED TRACKS.

At Conneaut Harbor, Ohio, about 65 miles east of Cleveland, the Bessemer & Lake Erie is erecting an interesting four-track truss bridge, styled technically a double-track bridge, because two tracks are outside the trusses.

The bridge is a 235-ft. draw span, heavily braced on top to carry an additional track on each side, suspended from the top cross frames, the depth of the floor being too shallow to permit sufficiently rigid construction to carry the tracks on cantilever beams. The cross sections herewith show the bracing. The bridge was designed for Cooper's E-60 loading.

Construction was started late in March of this year. The piers and abutments are being built by the railway company, the American Bridge Company having the contract for the steel superstructure. The layout and masonry were designed in the office of the chief engineer of the railway, and the steel work was designed by the American Bridge Company. The estimated cost of the substructure and superstructure complete is \$151,000.

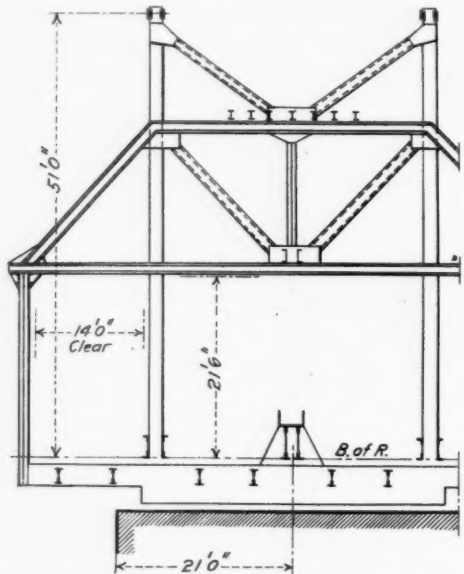
The layout of the new Dock Four yard, including this new



Lay Out for Bridge and Yards at Conneaut Harbor; Bessemer & Lake Erie.

bridge, is shown herewith. On Dock Four are four hydraulic 10-ton bucket machines and four electric 5-ton bucket machines, to load cars on tracks 51, 52, 53 and 54. To load cars on track 55 a 15-ton bucket electric machine will be installed. Track 1 will be used in hauling ore from tracks 51, 52, 53 and 54; and track 3 will be used in hauling ore from track 55. Track 2 will be used by all engines returning.

Track 4 will be used for delivering empties, which are fed in at the rear of Dock Four and handled by a haulage system around the loop and under the machines. The ore is pulled by

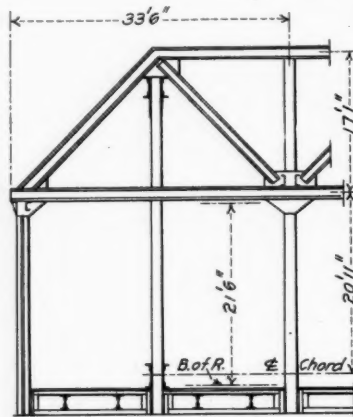


Section at Center.

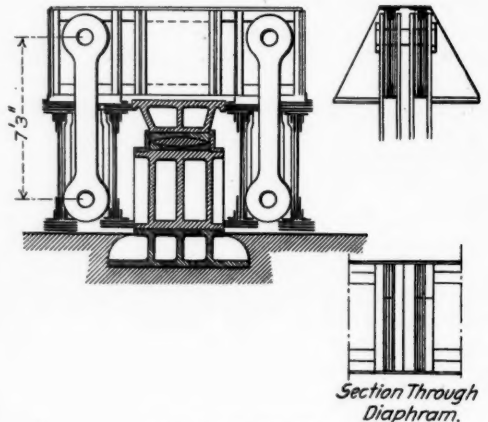
Sections not given are same as for Truss C.

an engine from Dock Four to a point about opposite B. The head engine then shifts over to track 2 by the crossover A-B or C-B. An engine from track 2 comes up from the rear, through one of the crossovers M-N or O-P, and pushes the cars over the hump to the scales. The machinery when completed will have a capacity of 100 cars an hour.

We are indebted to H. T. Porter, chief engineer of the Bessemer & Lake Erie, for the description and illustrations of the yard and bridge.



Section at Truss C.



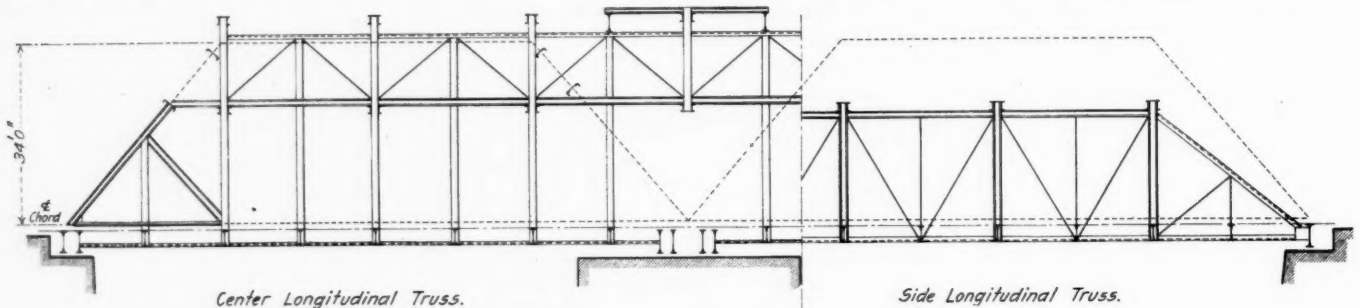
Detail at Center.

Section Through Diaphragm.

#### CONTRACT FOR SIAMESE BRIDGES.

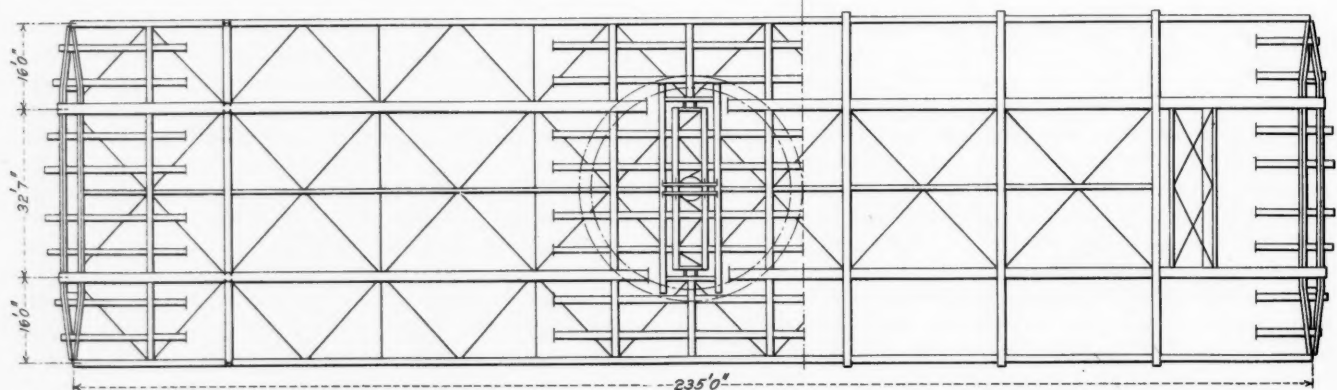
The Cleveland Bridge & Engineering Company, Ltd., Darlington, England, has recently been awarded, by the Royal Siamese State Railways, the contract for the early delivery of the steel work for 15 new bridges required in connection with an important scheme of railway development resulting from the recent Anglo-Siamese treaty. About 15,000 square miles of territory was ceded to the British Empire, and about \$20,000,000 was advanced to Siam at 4 per cent. for the extension of the railway from Bangkok to the new British border in Kelantan. This line will link up the Siamese railways to the

recently made Federated Malay States lines from Singapore. About 120 miles of the Malay line was opened last year, and another 76 miles has recently been opened, leaving an additional 150 miles now under construction to the Siamese terminus. Through railway communication will thus be afforded between Singapore and Bangkok, and the connection of the Southern Burmese and the Malay State lines, by way of the Siamese railways, will eventually be possible. Two of the bridge spans ordered from Darlington are required for the Petchaburi river, nine more spans are soon to be shipped from the Tees to the eastern side of the Malay Peninsula at Singora Roads, and the remaining four will be sent to the western seaboard at Trang Roads.



Center Longitudinal Truss.

Side Longitudinal Truss.



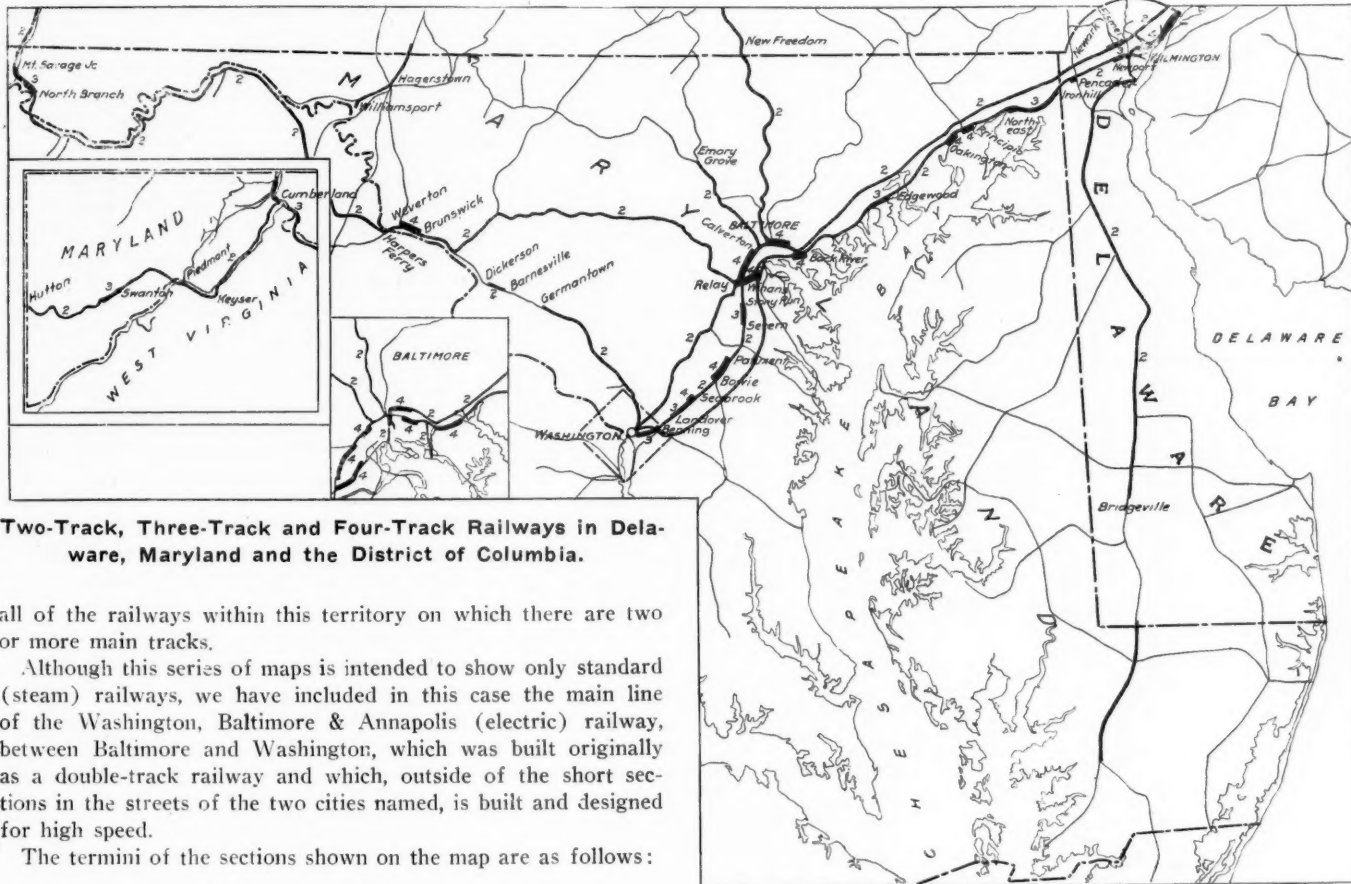
Plan and Longitudinal Sections of Four-Track Draw Span.



**MULTIPLE TRACK RAILWAYS IN DELAWARE, MARYLAND AND THE DISTRICT OF COLUMBIA.**

The map, shown herewith, includes the states of Delaware, Maryland and the District of Columbia and is designed to show

	No. tracks.	Approx. miles.
Winans to Stony Run .....	2	3
Stony Run to Severn .....	3	3
Severn to Patuxent .....	2	6
Patuxent to Bowie .....	4	4
Bowie to Seabrook .....	2	5
Seabrook to Landover .....	3	4



**Two-Track, Three-Track and Four-Track Railways in Delaware, Maryland and the District of Columbia.**

all of the railways within this territory on which there are two or more main tracks.

Although this series of maps is intended to show only standard (steam) railways, we have included in this case the main line of the Washington, Baltimore & Annapolis (electric) railway, between Baltimore and Washington, which was built originally as a double-track railway and which, outside of the short sections in the streets of the two cities named, is built and designed for high speed.

The termini of the sections shown on the map are as follows:

**MARYLAND AND DELAWARE.  
Baltimore & Ohio.**

	No. tracks.	Approx. miles.
Chester, Pa., to Elsmere, Del.....	2	15
Elsmere to West Junction .....	2	2
West Junction, Del., to Huntington Ave., Md.	2	63
Huntington Ave., to Mount Royal.....	4	3
Mount Royal to W. Baltimore .....	2	4
W. Baltimore to Relay .....	4	5
Relay to Washington, D. C.....	2	31
Washington to Germantown.....	2	26
Barnesville to Dickerson .....	2	3
Relay to Brunswick .....	2	66
Brunswick to Weverton .....	4	3
Weverton to Harper's Ferry, Va.....	2	3
Baltimore to Locust Point .....	2	3
Patterson, W. Va., to North Branch.....	2	6
North Branch to Mt. Savage Junction.....	3	6
Mt. Savage Junction to Penn. State line....	2	5
Cumberland to Keyser, W. Va.....	2	24
Piedmont, W. Va., to Swanton.....	2	12
Swanton to Altamont .....	3	4
Altamont to Hutton, W. Va.....	2	14

**Northern Central.**

Baltimore to New Freedom, Pa. ....	2	37
<b>Philadelphia, Baltimore &amp; Washington.</b>		
Penn. boundary to Wilmington .....	4	7
Wilmington to Mill Creek .....	2	1
Mill Creek to Newport .....	3	3
Newport to Pencader .....	2	8
Pencader to Newark .....	3	1
Newark to Iron Hill.....	2	2
Iron Hill to Northeast .....	3	10
Northeast to Principio .....	2	6
Principio to Perryville .....	4	2
Perryville to Havre de Grace.....	2	1
Havre de Grace to Oakington .....	4	2
Oakington to Edgewood .....	2	12
Edgewood to Magnolia .....	3	2
Magnolia to Back River .....	2	15
Back River to Bayview .....	4	2
Bayview to Baltimore .....	2	3
In Baltimore .....	4	1
Baltimore to Lafayette .....	2	2
Lafayette to Calverton .....	4	1
Calverton to Frederick Road.....	2	1
Frederick Road to Winans .....	4	4

Landover to Bennings .....	2	4
Pennings to Washington .....	3	3
Magruder—Union Station, Washington ...	2	5
Wilmington to Bridgeville.....	2	76

**Western Maryland.**

Baltimore to Emory Grove .....	2	20
Williamsport to Pennsylvania state line...	2	12
<b>New York, Philadelphia &amp; Norfolk.</b>		
Delmar, Del., to Kings Creek, Md. ....	2	22
<b>Washington, Baltimore &amp; Annapolis.</b>		
Baltimore to Washington .....	2	38

**LOSS AND DAMAGE—CAUSES AND REMEDIES.\***

BY OTTO BEST,

Air-Brake Inspector, Nashville, Chattanooga & St. Louis.

The question of loss of and damage to freight is receiving general attention, and three railways are spending large sums for its prevention—the Southern, the St. Louis & San Francisco and the Atlantic Coast Line. The first two roads are maintaining loss and damage bureaus at an expense of at least \$30,000 yearly, but you will agree with me that the money is well spent when I say that the Southern saved \$800,000 in the last fiscal year, while the Frisco saved \$90,000, it being the first year of its bureau's existence.

The payments for loss and damage, which are all pure waste, are conservatively estimated at \$20,000,000 per year for twenty-one railways alone, doing approximately half the business of the United States. I am glad to say, however, that the end of this state of affairs is in sight. Now that interest has been awakened, some of the best brains in the country are giving the matter serious consideration. In fact, there is nothing new in the whole proposition. It is simply a question

\*Abstract of an address before the Nashville (Tenn.) Association of Railroad Officers.

of securing a general and rigid observance of the rules and regulations which have been in effect for years.

In the beginning let me say that the prime requisite for the successful transportation of any commodity is proper packing and marking by the shipper. You may load freight by the best methods ever devised and stack it with the greatest care that human ingenuity is capable of, but if the crating is insufficient to begin with it will be damaged, and if not properly marked it will go astray, in spite of all that can be done to prevent it. On the face of it, this is a simple problem, and it would be if the traffic people of all lines would get together and agree on a uniform classification with regard to marking and packing. There are indications that this will be done in the near future, as steps have already been taken in that direction, but I am afraid the years of indecision have done their work too well, and shippers have become too thoroughly imbued with the "let-the-railway-pay-for-it" idea for us to expect a revolution. There are any number of rates, made for the most part years ago when conditions to some extent justified them, but which have been maintained long after their usefulness has been outgrown, simply because each of the traffic men was afraid to be the first in the field and all of them could not agree on just what changes should be made. Everybody seemed to be afraid they might lose a little business. They were all out for tonnage and the net earnings could go to smash. As a result, agents are compelled to go on accepting freight that is not properly crated, or, rather, not crated at all, and the claim agent pays for it.

Let us follow a shipment of merchandise from loading station to destination. The shipper's dray drives up to the freight house, backs up to the door, and the trouble begins. The receiving clerk has from five to fifteen doors to look after, and in the rush hours he has all he can do to sign the tickets, so the inspection of the freight unloaded at each door is out of the question. Besides, this man, and in some cases, boy, whose signature on a bill of lading binds the company tighter than Dick's hatband, receives the magnificent stipend of \$50 per month. Most of them will sign for anything and everything that is unloaded, and some of them will even go so far as to sign for goods that the driver does not take out of his wagon.

The freight is now piled up in the doorway and subject to the tender mercies of the truckmen. At most of the larger freight houses the loading is handled by some kind of a tally system, a number of which are in vogue, but the principle is practically the same in all. Personally, I favor what is known as the "Veri-Check" system of loading freight, and we are using it now at Atlanta, Chattanooga and Nashville. Let me say, however, that almost any kind of a loading system is practical as long as it is handled strictly according to rule, but the minute the discipline is relaxed the system goes to pieces and becomes a hindrance rather than a help. This is the fate of most of them.

It is now time to load the freight in the cars. The bill of lading has been signed and goods "received in good order," although the receiving clerk doesn't know whether the box of groceries for John Smith, Smyrna, Tenn., is actually marked John Smith or John Jones, Smyrna, Tenn., or Smyrna, Ga. The car for Smyrna is indicated by the number "1," let us say, so the clerk makes a figure "1" on the box with a piece of blue keel. I say the clerk does this, but in most cases he is too busy, and the work is too simple for a white man to bother with, anyway, so he, by tacit consent, delegates it to the negro boss of the loading gang. This man is usually a pretty bright sort of a fellow and far better posted than the clerk, so it practically makes little difference. So Sam or Jim drives up with his truck and is given a slip of paper directing him to car No. 1. We will suppose the slip in this case is legible and reads more like a figure 1 than a 7 or anything else, or if the number happens to be a 16 we will trust it doesn't get turned upside down so it will be taken for 91, and if the trucker isn't more than usually reckless the box will finally reach the car to which it

belongs. Here is where the loading clerk comes in for his share of the dirty work. The car may be filthy, but he doesn't see it. It may be leaky, but the loading is done in a freight house and the rain never enters there. It makes no difference whether the car has been used for phosphate or coke loading, and shows it, or has been emptied of lime, oil or salt pork. In goes the freight—flour, print cloth, meal, anything susceptible of damage from dirt, grease, nails or water. He puts in freight that belongs in other cars and leaves out freight that should go in this one. The main thing is to get the stuff out of the house before quitting time, so why bother about the way it is loaded? Throw the flour up against the can of oil, set the stove up on the cracker boxes, put the little parlor table astride the coffin and top it with the heaviest castings you can find to hold it all down! Find a nice clear space for the carboy of sulphuric acid, it will need exercise and it won't hurt to let it roll about a little, no matter if it does find an old affinity in the half-crated showcase a few feet away and crushes it to pieces in its loving embrace before the journey is over. And remember that the lightest stuff must be loaded as close to the floor as possible and the heavy freight piled on top to hold it down. And always stack the load up as high as you can so it will all tumble down at the first coupling. This loading clerk may be honest, but evidently he does not consider it dishonest to overlook the bad order of a package, or even help himself to any little thing that will most likely not be missed. It has all been receipted for and his record must show it "loaded O. K. as billed," so it will never be known where and how the loss or damage occurred. Again, he is not always careful about checking into the car, and if the goods which were unloaded from the dray have disappeared and he has any items unchecked he marks them off on his tally-sheet just the same. He knows that the all-powerful rubber stamp in the station master's office will shield him from all harm. And the "O. S. & D." clerk in the superintendent's office finds himself "up against a blank wall" some days later when he attempts to investigate.

This matter of properly stacking the merchandise in the car is by all odds the most important single feature in the prevention of loss and damage. It is hard for the average station-master to realize that the old link-and-pin days are past and gone and that coupling nowadays is done by impact, necessitating the stacking of freight in such a manner as to withstand a considerable number of heavy shocks. We can't handle cars without these shocks, and this fact should be given due consideration. But it is astonishing the amount of carelessness, or rather the lack of plain common sense, that is displayed. Why, the other day I had occasion to examine a car of eggs which was received at Nashville from a station on one of our branches about twenty miles away. The car contained about 200 cases of eggs and the crates were stacked high in each end of the car, leaving a clear space in the doorway. Of course the very first hard jolt the car received resulted in an avalanche of egg cases, and the way they piled up and burst in the doorway was a sight to behold. Again, I saw a car from a small local station, one end of which was saturated with oil. In this end the agent had loaded flour, and in the other, which was perfectly dry, he had loaded a lot of sash weights.

Now, the loading of a straight carload of any commodity, where the packages are all the same kind, is a comparatively easy matter and is simply a question of stacking the packages in a solid, compact mass. But the usual merchandise or package car, such as compose the output of the freight houses, is a different proposition, and here the loading becomes a matter of the utmost nicety of judgment and a great deal of skill. In the first place, the freight must be loaded in station order, and it must also be put in the cars as fast as it reaches the freight house, so the loading clerk can hardly be blamed if in a great many cases the loaded car presents the appearance of the aftermath of a cyclone in a junk shop. He is compelled to load in station order, and butter and cheese for



station A must be placed in close proximity to the coal oil for station B, or there will be a howl from the local conductor, while if the coal oil flavors the butter there will be a kick from the claim agent, so, between the devil and the deep sea, he naturally chooses the lesser evil. It is a certainty he will hear from the conductor in the next day or two, while the claim agent's complaint, if it ever reaches him, will be a year old. It is a heinous crime to delay a local train at a station two or three minutes in order to find a piece of freight, while it is the claim agent's business to pay claims. So the loss and damage account grows.

Of all the awkward, unhandy stuff to load, household goods take the cake. And here again our friends in the traffic department have thrown us down. Furniture, bedsteads, dressers, washstands, chairs, rockers, cots, lounges, wardrobes, are accepted in less than carload lots, with practically no protection whatever. Bed ends and rails are tied together with the varnished surfaces exposed, chairs are placed seat to seat and tied with a piece of string, expensive furniture of all kinds is merely wrapped in paper, with now and then a handful of excelsior to prevent chafing. It is impossible to load this kind of freight so it will not be damaged. Rockers are exposed to anything that will break them off, or else they punch holes in the half-crated mirrors and family portraits. There are no hard and fast rules for loading this kind of stuff. You just have to use the best judgment you are capable of and trust in Providence.

While we are on the subject, let us take a look at pianos and organs. The classification is all right here, and expressly provides that pianos not boxed shall not be taken. But there used to be a time when we would accept them any old way, and some of our agents seem to be living in the past, as far as this is concerned, as you will see one every now and then moving without proper protection. Pianos and organs should always be loaded "fore and aft" or lengthwise in the car, and when trucking the truck blade should go underneath the box containing the instrument.

On our line, claims for damage to flour and mill products represent one of the largest items. And let me say here that the common flour sack is an abomination. It is made of the very flimsiest fabric, which has to be filled up with sizing before it will begin to hold anything. It is often poorly sewed; the stitches are taken too far apart and tear out in handling, and you lose a couple of handfuls of flour every time you pick the sack up by the wrong end. The cars are studded with hundreds of projecting nails and, as if this were not enough, the tags with which the sacks are marked are fastened with a wire staple. When a tag is sheared off, as 50 per cent. of them are, a gaping hole from one to two inches long is left. Or the negro truckman or a brakeman will cut his hand on the wire and jerk the tag out by the roots by way of retaliation. You can sweep up a half-bushel of these tags in almost any freight house. Flour is a commodity which requires a first-class car, one that is clean inside, with a good roof and door and with no projecting nails to tear the sacks. The floor should be covered with clean, odorless sawdust or heavy paper to keep out the dust and dirt. The nails should be removed from all cars before they are loaded with any kind of merchandise. We are doing this at all our stations, and it is well worth the trouble. And for flour and cement loading, or for any freight that can be damaged by water or moisture, the doors and windows should be cleated. Not more than one car door in three is water-tight when exposed to a hard, driving rain, and this will have to be guarded against if you do not want your flour to reach the consignee in the shape of dough.

Did you ever see a shipment of oil which didn't leak? The ordinary jacket can is responsible for a lot of trouble. The jacket is not sufficient protection and very little care is taken to prevent damage, so if the can isn't mashed it falls over and rolls about, the stopper comes out, and the result is a puddle of oil on the floor. These cans should be placed against

the side of car and a piece of wire used to fasten them upright. Barrels, carboys, kegs and any heavy cylindrical containers which are liable to roll about and damage other freight should be blocked.

Green hides are hard to handle. They always leave a puddle of foul-smelling brine to mark the place where they have been, and everything this brine comes in contact with is damaged. The car floor under the hides should be covered with sawdust several inches deep so the brine will be absorbed.

Hollow ware and stove furniture come in for a large amount of breakage. Pots and kettles are often nested, causing them to wedge down and those at the bottom to burst apart, or they fall over and roll about or other freight falls on them. The present practice of accepting such articles in bunches fastened with wire should be discontinued and shippers required to box or barrel them and pack them in straw. Until this is done we shall have to go on accepting them loose and should handle them as carefully as we would so many eggs.

I might go on and cite practically every item listed in the classification, but I would not cover any ground that has not already been gone over time and again by men much better qualified than I am. The matter of loading any kind of freight is largely one of just plain common sense and judgment and is governed to a great extent by circumstances.

In conclusion, the first requisite for the success of any steps toward the prevention or reduction of loss and damage is the hearty, whole-souled co-operation of every man in the service, from the general manager down. When you have this you are sure of results. There never was a reform or improvement, however badly needed, which did not meet with opposition in some quarters, and my experience has been no exception to the rule. We have some obstructionists on our line, men who have been plodding along in the same old rut for years, but to offset these we have any number of wide-awake, progressive agents who are with us heart and soul and who will even go a little out of their way to help us make a good showing. It is to this we attribute the fact that our efforts are meeting with most gratifying success, and that our loss and damage expenses for the last two months reported show reductions of 64 and 74 per cent., respectively, from the same months of the previous year.

### THE PAINTING OF CEMENT AND CONCRETE STRUCTURES.\*

BY CHARLES MACNICHOL.

Practical requirements compel direct treatment of the freshly built cement surfaces so as to adapt them to receive the materials which the paint trade is familiar with and which are in common use. Numerous methods have been tried for years. Their failure in most cases is due to the painter's lack of knowledge of the oil destroying property of the alkali in the cement and of the value of such chemicals which science has given us for the neutralization of these alkalis.

We need a paint combining three properties, as follows:

First—Reasonable permanency of the painted surface.

Second—Freedom of chemical action on the oils.

Third—Assurance that the tints or colors will remain unimpaired.

The writer desires to submit a method which has given the nearest approach to fulfilling these requirements. I have used it in my business for years with success, and it has proved not only practical in application but successful in results, combining, as it does, freedom from danger to those handling it, simplicity of preparation and application, and reasonableness of price.

The cement surface is treated with a solution of zinc sulphate and water, mixed equal parts by weight, and applied with an ordinary bristle brush after the cement is dry. If one precaution is observed, that of allowing 48 to 72 hours as a drying

\*From a paper presented before the American Society for Testing Materials, June 30.

period, this treatment will render a cement wall as safe to paint as an ordinary plaster wall.

Dr. Allerton S. Cushman, chemist in charge of physical and chemical investigations, Office of Public Roads, United States Department of Agriculture, gave me the following explanation of the chemical action of the zinc sulphate:

"It is my belief that the zinc sulphate is very well adapted to this purpose, owing to the fact that when zinc sulphate is brought in contact with the calcium hydroxide (hydrated lime) a chemical reaction results in the formation of calcium sulphate (gypsum) and zinc hydroxide (hydrated oxide of zinc).

"It is apparent from this that after the surface has become thoroughly dry again it will contain within its pores a mixture of gypsum and zinc oxide. These materials have no bad influence on linseed oil and, in fact, are frequently used as paint pigments.

"The reason why such treatment should be necessary before applying a paint coating to the surface of concrete must be apparent to every one. When Portland cement sets a certain amount of lime is set free in a hydrated condition as calcium hydroxide. This is a strong alkali, and tends to saponify the oil in the paint coating, and thus destroy it. The work done by the application of zinc sulphate is to destroy this alkalinity and change the calcium hydroxide into a mixture of calcium sulphate and zinc oxide. I do not know of anything that would answer this purpose better than zinc sulphate."

A very important point is the filling of the pores of the concrete, thus keeping the oil paints applied from penetrating too deeply into the cement.

#### THE SINGLE-PHASE RAILWAY BETWEEN ROTTERDAM, THE HAGUE AND SCHEVENINGEN.

BY C. VAN LANGENDONCK.

This new railway is to deal with the traffic between Rotterdam, The Hague and Scheveningen, which is specially heavy in the summer months, and will relieve the present steam railway of some of its congestion. From the station at Rotterdam, whence the line starts on an armored concrete viaduct 5,200 ft. long (described in the *Railway Age Gazette*, November 26, 1909), the railway runs in a northerly direction, and in practically a straight line, for 12½ miles. At this point it divides, one part of the line running north to Scheveningen and the other west to The Hague. To facilitate direct service between The Hague and Scheveningen there is here a triangular junction. The distances are: from Rotterdam to The Hague, 15 miles; from Rotterdam to Scheveningen, 19 miles, and from The Hague to Scheveningen, 7½ miles. The length of double line is 20 miles, and length of track, including that in the stations, about 47½ miles. Owing to the marshy nature of the ground, the building of the railway itself has given rise to many difficulties and for a part of the line a pile foundation has had to be used.

The power station for supplying energy to the railway is at Leidschendam, 11 miles from Rotterdam. Three-phase current is generated, and this is transformed by the alternators to two-phase current at 10,000 volts.

The line is divided into two parts, corresponding to the two phases. The separation of the two phases occurs at a point near the power house, and in ordinary working the loads on the two phases are separated. The overhead wires are broken and divided by a dead section of about 40 ft. long. The northern section is fed at a place 8 miles from Rotterdam and quite close to the power station. The arrangement is shown in Fig. 3, in which the letters indicate as follows: i., ii., iii., iv.—feeding points; a—feeder for Rotterdam phase; b—feeder for Scheveningen phase; c—car shed; D—power station; i, i, i.—section insulators; K—phase separation.

The rails are connected through the earth to the power station by means of bare copper wires. Similar feeders supply the southern section of the line. The supporting wires

have all been erected on the well-known Siemens patent multiple catenary system. The testing of the insulators on this line (which is carried out at a voltage between 25,000 and 30,000 volts) is done during the time that the line is shut down. For testing, an accumulator locomotive is used, on this is a converter driven by a direct-current motor, from which the necessary high-tension three-phase current can be obtained.

The posts for the most part are fixed in concrete foundations, each cast in a special cast-iron box sunk into the earth; this because of the spongy nature of the ground. The trolley wires are automatically stretched by a weight, and are continually under a tension of about 1,000 lbs. Two cross-wires are provided at each station, making it possible to make dead the trolley wires at the station without affecting the working of the rest of the line; and each wire can be entirely cut out between any two stations. Two kinds of bonds are used on the rails for the return circuit, copper bonds being employed in the stations. These are fixed into the rail holes by means of two heavy copper plugs and a steel key. On the open sections copper strips are used, which are fastened to a brass plate at each end and soldered to the rail.

The cars are arranged with central corridors, the seats being placed each side and separated from each other by a low partition. The roofs are specially designed to reduce air resistance to a minimum—in other words, they look like American passenger car roofs. Two types of motor cars are being used, the first of which is intended for both second and third class passengers and the second for second-class. The first kind of cars have 24 seats for second-class passengers and 49 for third-class passengers, together with room for 14 standing. The second-class car has room for 56 passengers sitting and 14 standing.

Each car is fitted with electric lighting and heating, the cold in winter being sometimes intense. The driving platform contains, besides the controller, a switch for working the brakes both automatically and by hand, a lever for raising and lowering the collector and the valves for working the sanding equipment, the whistle, etc. The car body rests on a frame of channel iron. The bogies have been designed with special reference to the high speed at which the trains are to run, and they differ from the usual arrangement in that there are no bolsters but only a king pin, which can move in a direction at right angles to the length of the car, and is held in the middle position by means of strong springs. The weight of the car body is carried by two rubbing side plates on the bogie. These, by their friction, reduce the side motion of the king pin when going around curves. In the bogies both plate and spiral springs are used, and each wheel is fitted with two brake blocks. For driving purposes, only one bogie of each motor car is fitted with motors, while to the other is fixed a 5-h.p. alternating current motor, working at a voltage of 110, which drives the air pump supplying the necessary compressed air to the brakes, etc.

Only low-tension conductors appear on the driver's platform and in the cars, the maximum voltage being 300 volts. All high-tension parts are exclusively fixed in a special chamber, all accessible parts of which are well grounded. The conductors are carried in iron and steel troughing, which is fixed on unflammable supports. A lightning arrester is fixed on the roof of the car to protect the train against atmospheric discharges. Besides the motor cars there are also a certain number of trailers. These have room for 88 third-class passengers sitting and for 20 more standing. The lighting and heating of these cars are carried out from the motor cars by means of flexible connecting cable, while the control cable is also led through the cars so that multiple control can be employed. The motor cars have the following main dimensions: length between buffers, 61 ft.; available length, 57 ft.; total height, 14 ft.; height of bodies, 10 ft.; breadth, 10 ft. 4 in.; weight, 51 tons. The weight of the trailers is 30 tons.

The high-tension current is led into the car through two



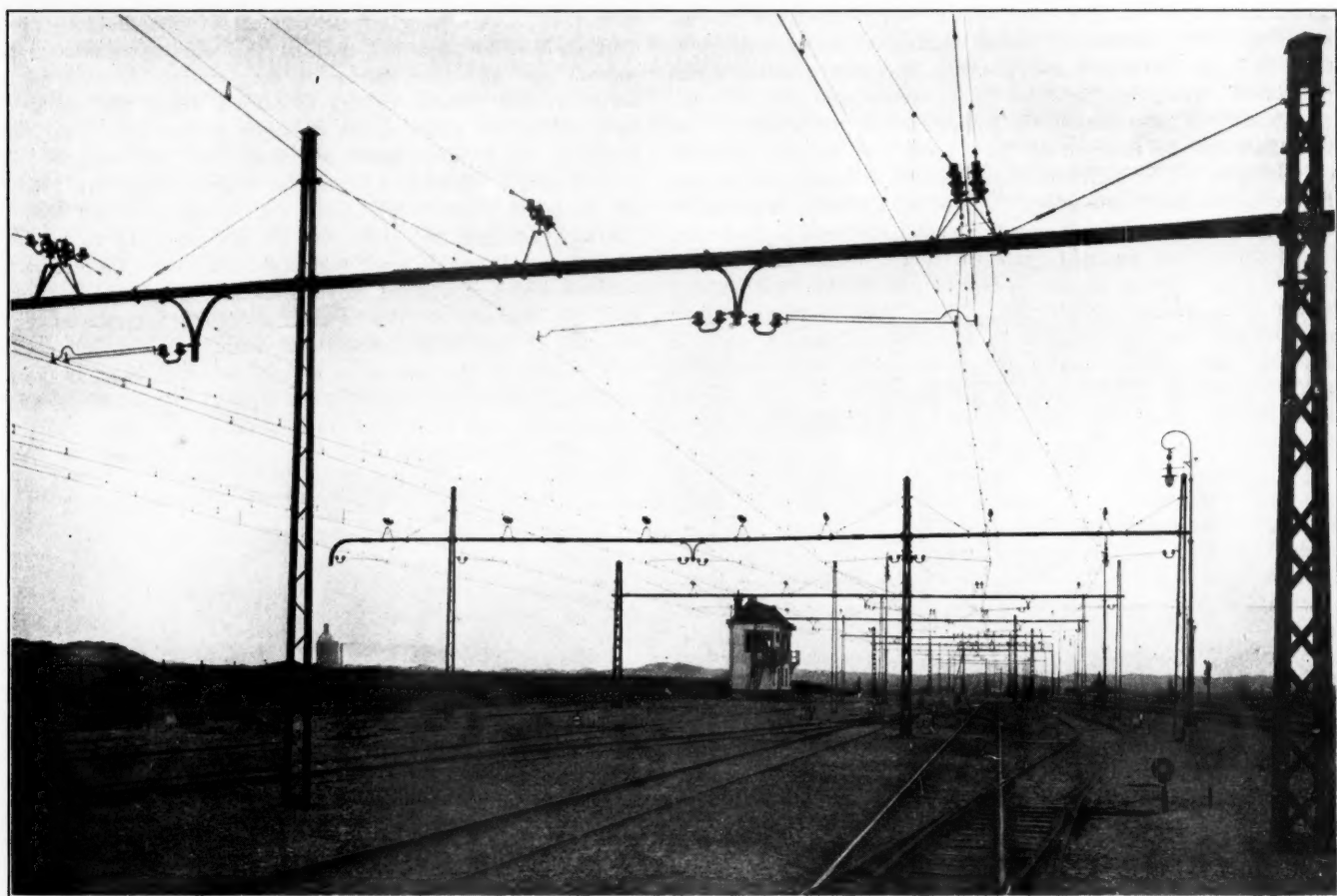


Fig. 1—Rotterdam-The Hague-Scheveningen Electric Railway Terminus at Scheveningen.

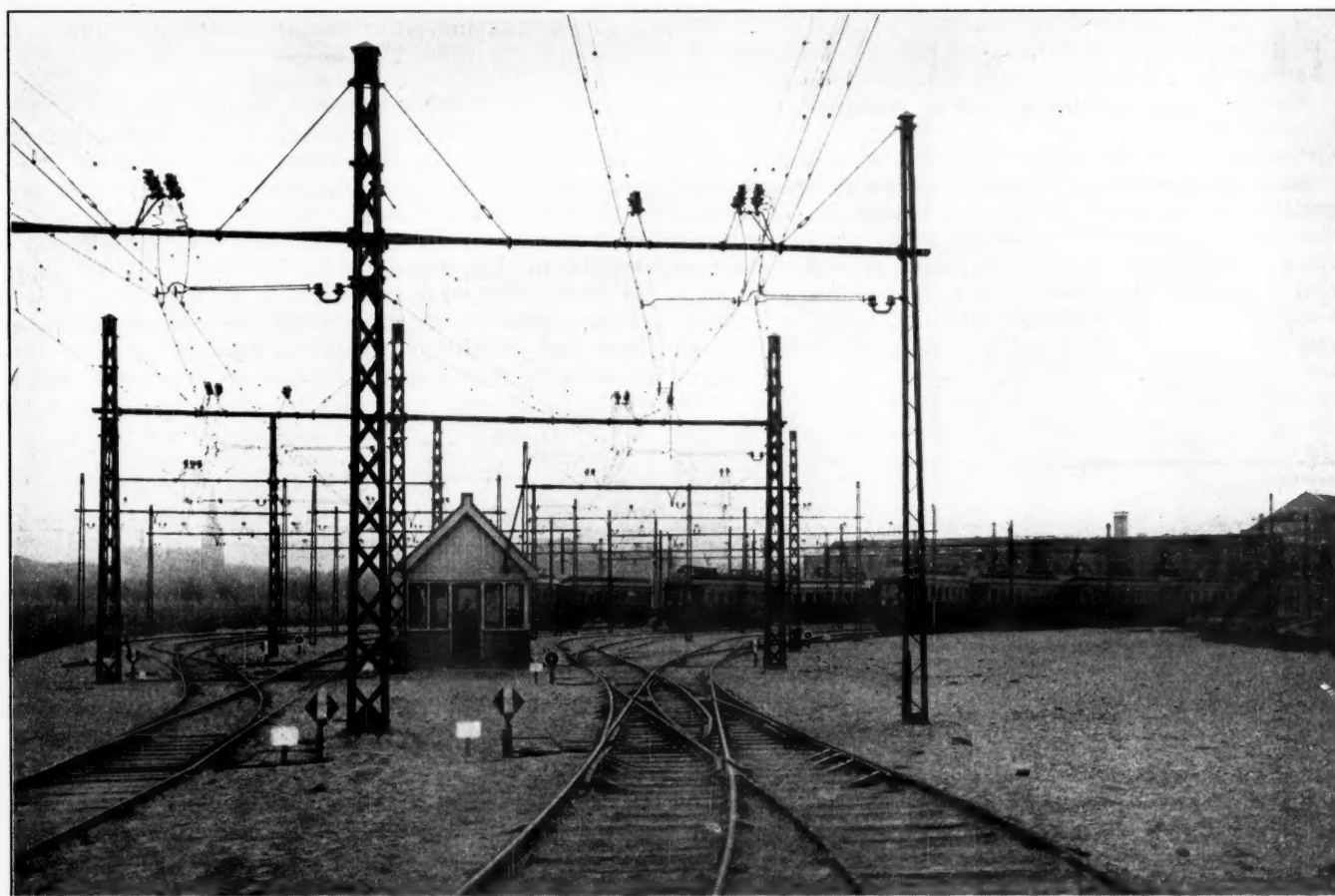


Fig. 2—Rotterdam-The Hague-Scheveningen Railway Yard at Leidschendam.

collectors placed on the roof, these being fixed on 12 insulators. The collector is spring controlled as regards rotation, and can be raised and lowered by chain gearing which is worked either by hand or by a compressed air arrangement. By the compressed air equipment all the collectors on the train can be lowered at once from one driving platform or the other. The high-tension conductor is connected to two high-tension fuses, placed in a special chamber, through a choking coil, and where it passes through the roof is protected by means of an air-tight micanite tube. From one of the high-tension fuses a circuit is tapped off to the lighting and auxiliary apparatus transformer. This latter is fitted with a magnetically operated switch, a charging resistance and an overload relay, which can also be worked by the emergency alarm current from the driving platform. In case of danger it is thereby possible to cut out all the high-tension switches from the foremost driving platform.

The main transformer, besides supplying the driving motors, also supplies the motor for driving the air compressors. The driving of the car is effected by means of alternating current series motors of a capacity of 180 h.p. when running at 750 r.p.m. The driving bogie is fitted with two motors which drive the axles through gearing with a reduction of 1 to 3, the maximum speed of the train being 55 miles an hour. The motors, which are totally closed and of the Siemens Schückert compensated series type, are provided with auxiliary poles which are excited by current of such a phase that at any determined speed the transformer and reactance voltage are both neutralized to such an extent that all sparking is quite overcome. The armature is built of

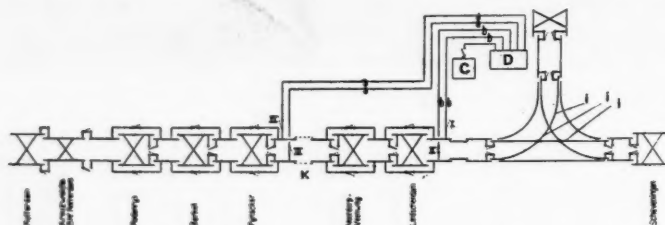


Fig. 3—Arrangement of Feeders.

slotted laminations in which the winding is embedded as in a direct-current motor. Between the windings and the commutator are connected resistances designed to reduce the short-circuit current under the brushes during running. These resistances are fixed in the upper part of the slot in such a way that they increase the torque of the motor to a useful extent. There are eight collecting points, at each of which are fixed four brushes, the brush-holders being fixed to one ring, which, by loosening a set screw, can be moved around for inspection and maintenance of the brushes. The stator winding is distributed equally over the whole circumference and consists of two parts: an exciter winding, which is used for generating the main magnetic field, and the compensating winding, which neutralizes the armature field. A part of the latter is also used for generating the auxiliary field. Only one part of the exciting winding is connected in circuit according to the direction in which the train is running. The control of the train is effected by means of electromagnetic apparatus. The contactors are worked by alternating current magnets and operate practically sparklessly, requiring very little current. The various contactors are so connected by a simple lever arrangement that short-circuiting of single transformer coils can never take place. The operation of the contactors can be effected from either end by means of a master controller. The control current is taken from the lighting transformer. The regulation of the motors is effected in the usual way. Only four contacts are needed for each motor, although it is possible to work with seven in all. Of the eight contacts two are always in circuit. The secondary winding of the main transformer is divided

into two parts, which are so connected with the two motors that each motor and one part of the winding alternates both motors and the two halves of the winding making up one series circuit. Each motor, therefore, takes the same current, while the sum of the voltages in the two transformer windings is divided equally between the two motors. The four voltages obtainable from the first winding are 116, 175, 244 and 314 volts, while from the second winding they are 151, 210, 280 and 361 volts. On the first stop the two voltages of 116 and 151 volts are obtainable; the sum of these is 267, half of which is applied to each motor. It should be noticed that on account of this special switching arrangement and in spite of the series connections, there is never between any two points of the circuit a higher potential than in parallel working. In the motor circuit is also connected a special transformer with a ratio of transformation of one to one. The two ends of the primary of this are connected to one end of the motor's windings, and the two ends of the secondary to the others. The idea of this transformer is a double one; firstly, to enable one motor to be cut out in case of damage, and secondly, to prevent the circuit being wholly broken by the opening of the contactor. In this case the motor on which the contactor has opened receives its current from the secondary winding of the above transformer.

When two or more motor cars are coupled together the controlling current is passed along the train by means of flexible cable, which is fixed to special plugs on the car ends. For testing the lighting and the compressor circuits the cars are fitted with plugs by means of which current at 300 volts or 80 volts can be supplied to them.

At the present writing 52 trains are running during a working day of 16 hours. In the summer it is expected that 160 trains will run a day.

The whole of the electric equipment of this line was supplied by the Siemens-Schückert Company of Berlin.

## STEEL IN FREIGHT CAR CONSTRUCTION.

BY C. A. SELEY,

Mechanical Engineer, C., R. I. & P. Ry.

In the history of American railway car building and especially of freight cars, it is found that steel did not play an important part as a body material until very recent years. Iron and steel have always been used for bolts, rods and other fastenings, but wood has been the principal material for the framing, flooring, lining and roofing of the majority of cars. Wood was first displaced by iron or steel in the truck construction and side frames; cross frames and bolsters have been successively changed so that now wood is seldom found in modern freight car trucks. In car bodies steel was slower in obtaining recognition and use in lieu of wood; first in bolsters and then gradually into the sills and framing.

There is very little authoritative literature on freight car construction. It is mainly found in technical journals, club and society proceedings, and the M. C. B. Association standards and rules which have undoubtedly contributed most to the uniformity of car design in its general features.

In the designing of wooden cars, particularly those having superstructures, it was the common practice to provide for the carrying strength in the underframing and not depending on the superstructure framing for carrying any part of the calculated load. Not only was this the general practice of car designers and builders but the principle has been discussed and approved at railway club meetings which are on record.

The writer could not agree to this theory of design as applied to general car construction. It might be advisable as regards ordinary house cars of wood construction, but with other types of cars, particularly those presenting an unbroken side, such as flat-bottomed or hopper gondolas, there is such an opportunity presented for a truss or a plate girder of proper depth as to give any strength required with a minimum of



material. The writer has since found the same principle to apply in house car designs. There was no opportunity to make a demonstration of this belief that the side framing of a car could be successfully used in carrying a considerable proportion of the load until the year 1900, when as mechanical engineer of the Norfolk & Western, he designed a steel framing for a 40-ton flat-bottomed, drop-door gondola, using wood for floor, side and end lining. Five hundred cars were built at that time and 2,500 cars two years later, thoroughly and successfully demonstrating the principle involved.

The photographs show the design of these cars, using channel center sills, built-up body bolsters and trussed side framing made of standard sections of angles, channels, etc. Fig. 1



Fig. 1—N. & W. Composite Drop Bottom Gondola.

is of a completed car with load and was the first one of this kind and series ever built. Figs. 2 and 3 show the steel framing before the application of the wood floor and lining. Attention is called to the neat, trim appearance of these cars, the readiness with which they can be inspected, their light weight, yet withal a stiff, staunch construction. Drawings and description of the first car were published in the *American Engineer and Railroad Journal* of April, 1900, and also in other papers.

Following the successful application of the trussed side frame to the flat-bottom gondolas, designs were made for hopper cars which have been copied more or less exactly in many thousands of cars on various railways. Fig. 4 is of a steel underframe with wooden stakes and box, designed before the writer's connection with the road owning them and a lot of 1,000 were built with which we had some varied experiences. There being nothing on the diagonal except the chute planks, these had to take the full effect of fore and aft movement of the body when shocks occurred in trains of these cars when empty, and we had the fastenings of these planks fail in large

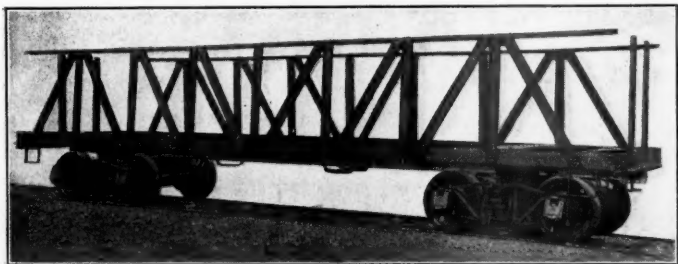


Fig. 2—Side View, Framing of N. & W. Composite Drop Bottom Gondola.

numbers, so as to require a modification that would permit a certain amount of swing. When loaded the wedge effect of the load did not permit the movement which so strongly manifested itself in cars running empty.

After our experience with the trussed-side, flat-bottomed gondolas, shown in Figs. 1 to 3, it was determined to apply the principle to the hopper design, which resulted in the car

Fig. 5, this photograph being of the first car of the design and series ever built. It will be noted that there is an open center panel and that several of the vertical members are extended below the bottom chord of the truss to assist in carrying the door supports. The steel frame-work for one of these cars is shown in Figs. 6 and 7. Drawings and descriptions were first published in the February, 1901, issue of the *American Engineer and Railroad Journal*, and also in other papers.

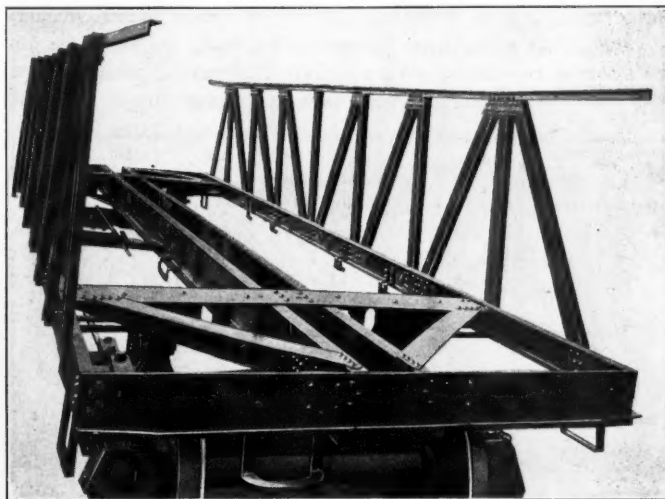


Fig. 3—End View, Framing of N. & W. Composite Drop Bottom Gondola.

The Delaware & Hudson copied the truss side feature, but with a different door arrangement; the steel frame is shown in Fig. 8, and a completed car in Fig. 9.

Ordinary bridge truss formulas were used in calculating the foregoing Norfolk & Western designs and subsequent performance shows these to have been properly used. In 1902 it was determined to build some box cars with complete steel framing, but with wood flooring, lining, sheathing and roofing. Box cars have side doorways, which do not permit of an uninterrupted truss. The center panel of the Burr truss of five panels which most closely approximates car framing is filled with an X-bracing which serves to carry over to the other side strains resulting from unsymmetrical loading of the structure. We must, however, leave the side doorways of the box car clear openings and just how to take care of the shear in case of unsymmetrical loading was first to be settled.

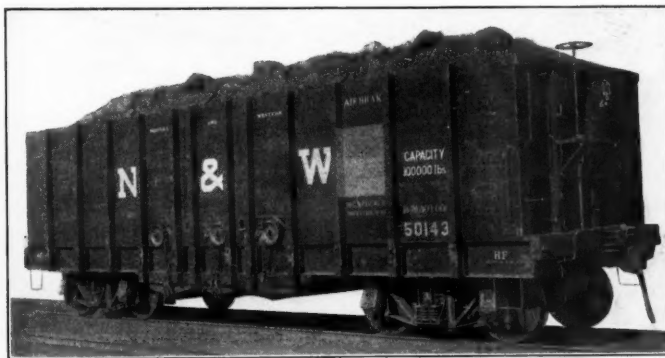


Fig. 4—Steel Underframe Hopper, with Wooden Stakes and Box.

A wooden model of the side frames was made on a scale of 1 in. equal to 1 ft. The posts and braces were notched over sills and plates and the latter was reduced so as to have no strength as through members or sills. A floor was laid and the whole structure mounted on the bolster bearings. A silk line was stretched and marks made for indicating deflection. The floor was then covered with cast iron washers and although the com-

plete model weighed but 2¼ lbs., it sustained over 200 lbs. of loading. The load was then removed from the ends which resulted in increasing the center deflection.

A considerable number of unsymmetrical arrangements of the load were tried and the gaging points on the frame showed the "S" curve, indicating shear in the center panel, but from deductions assumed from the results of these tests, use of some formulas on models and other calculations it seemed as though the X-bracing in center doorways might be omitted if the top and bottom members were slightly reinforced. As a matter of fact, however, the sections used in these side trusses are excessive for the strength required in order to have thickness of material that will stand the waste and corrosion in railway service, and as

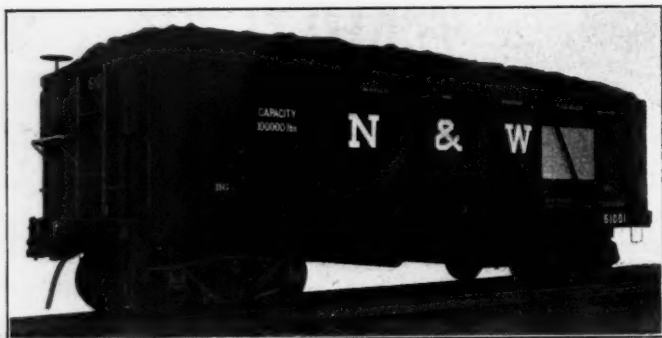


Fig. 5—N. & W. Composite Hopper Car.

some of the members are combined in the structure for other purposes as well, it is not difficult to get proper strength to resist shear in the doorway.

The first box cars built after this fashion proved that the calculations were correct and now many thousands of steel-frame box cars, stock cars, and other house cars have demonstrated the feasibility of the design.

The writer regrets not having a photograph of the very first steel-frame box car built from the design, but one from a later series is shown in Figs. 10 and 11. The open center panel at doorway in the sides may be particularly noted; and it will be noticed that in a general way there is a consistency and similarity in all the designs whether hopper or flat-bottomed gondolas or for box or other house cars.

Fig. 12 represents a complete steel-frame box car, and the only way to identify its construction is by the absence of truss rods under the car and its clear, open appearance, facilitating inspection and examination. This car is of the American Rail-

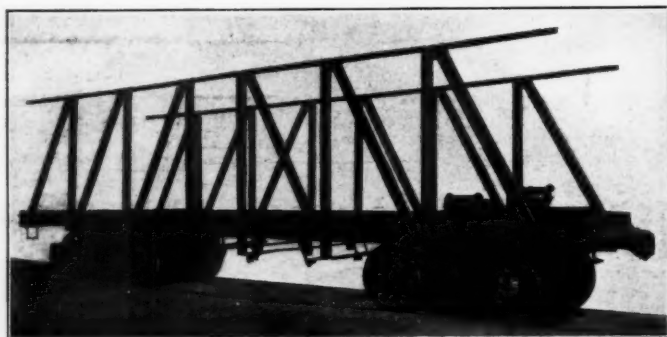


Fig. 6—Side View, Framing of N. & W. Composite Hopper Car.

way Association dimensions, viz.: 36 ft. long by 8 ft. 6 in. wide by 8 ft. high, inside measurements.

Fig. 13 is another complete steel frame for a box car, a later design, and is somewhat more complete than Figs. 10 and 11 in showing the steel girths in sides and ends. These assist materially in holding the ends of the car to resist the shock of shifting loads. The corner and end intermediate post are securely riveted top and bottom and with an inside

end wooden lining 1¾ in. thick, making an end construction that cannot be approached in wood construction. A new design of furniture car was built along these lines, 40 ft. long, 9 ft. wide and 10 ft. high, in which the side doors are each offset 27 in. from the center line. This is to facilitate loading of automobiles and other vehicles. It was somewhat of a problem to the designer, as it called for unsymmetrical

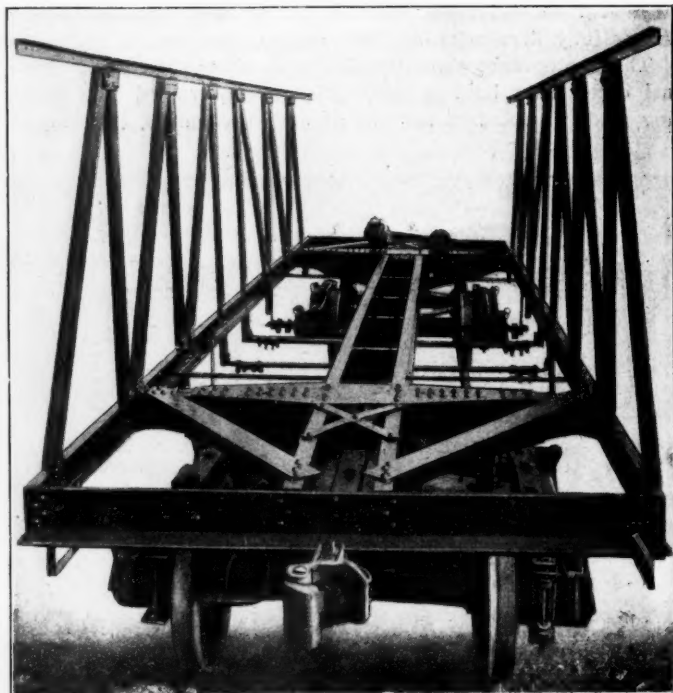


Fig. 7—End View, Framing of N. & W. Composite Hopper Car.

side framing and a diagonal connection in the underframing between door posts.

There are over 6,000 box cars of this design in service on the Chicago, Rock Island & Pacific and the St. Louis & San Francisco. These cars are 40 ft. long inside by 8 ft. 6 in. by 8 ft., and as the 4 ft. of extra length goes in between the bolsters the car is quite as strong laterally as those of the standard length of 36 ft. made up of similar sections. The

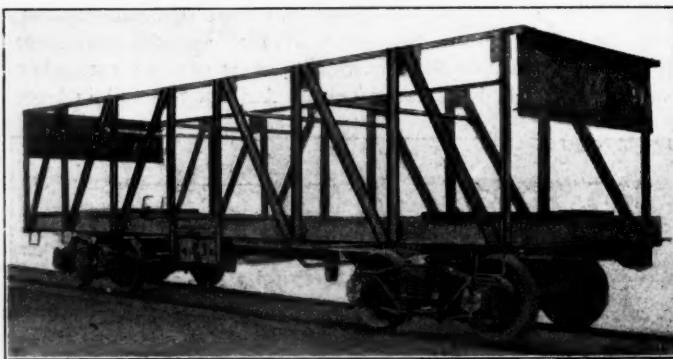


Fig. 8—End View, Framing of D. & H. Composite Hopper Car.

Norfolk & Western steel frame box car was first described in the May, 1902, issue of the *American Engineer and Railroad Journal* and also in other papers.

Fig. 14 shows a stock car which is an interesting example of this type of construction. The wooden slats are secured to the inside of the steel frame, leaving the latter outside and exposed.

A number of designers have used steel underframes for



freight cars, placing thereon a wood superstructure. In the case of house cars, however, there are many reasons why a complete steel frame is superior to the above arrangement. Any steel frame is designed to work within small limits of deflection, while the wood structure cannot be so limited, so that the two do not combine well. The requirements of modern

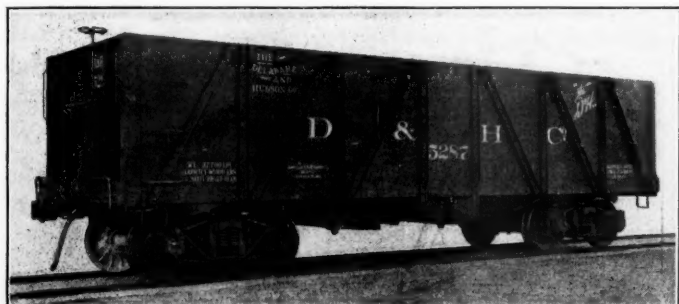


Fig. 9—D. & H. Composite Hopper Car.

train service are better met by steel framing, as it is almost impossible to so frame an end for a wooden car that it will successfully stand the shocks in switching and road service. Steel framing also resists bulging of the sides as the tension members are given a bowstring effect by the loading. Steel frame cars do not sag, sway or work so as to require the constant tightening up, renailing, etc., as is necessary on wooden cars. It is now very difficult to find lumber at all suitable for car framing and the prices have equalized so that steel can be used for framing at about equal or better cost than wood. As to whether we should go further than that in the use of steel is a question to be decided by local conditions. Lumber is still available for flooring, lining and covering, and probably will be for some years.

Considerations of weight and strength are of much interest in car designing and especially so in introducing steel wholly or in part in place of wood. Composite construction particularly favors economy of weight in open cars, giving high percentage of revenue load with low dead weight and the advantages of strength and durability. In steel frame house cars, however, these percentages of revenue load are necessarily lower, as the proportion of wood is higher than in open cars, this for roofing, lining and sheathing, and the nailing strips for securing them. The well-designed steel frame box car need not weigh more than a well-designed wooden car and be a better, stronger and longer-lived car. The economical ap-

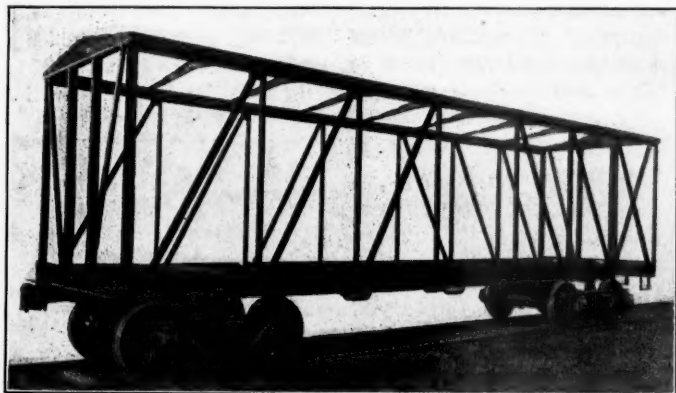


Fig. 10—Side View, Framing of Composite, Steel Under-frame Box Car.

plication of wood for lines, nailing strips and fillers is the more difficult part of the design of steel framed house cars in order to keep the weight down and still offer an adequate fastening surface to which to nail sheathing and lining.

Extensive use of cars of these types of construction has developed considerable information of interest. The cost of

repairs of freight cars is not generally divided on railways into sufficient detail to show the comparative costs for wooden and for steel or composite cars, but such information as we have is greatly in favor of the steel framed cars. In heavy repairs of wooden cars the cost may be divided into from two-thirds to three-quarters for material and from one-quarter to one-third for labor. When steel is used for framing the proportions are reversed, the larger part for labor and the lesser for material. In other words, the steel is again usable even though more or less damaged. Shocks which would break wooden members so as to require their replacement would in most cases merely bend or distort a steel one, which may be readily straightened and returned to service. A badly wrecked steel frame car looks rather discouraging to one not accustomed to handle such matters, but experience has shown this not to be as bad as it seems. Hand methods have been

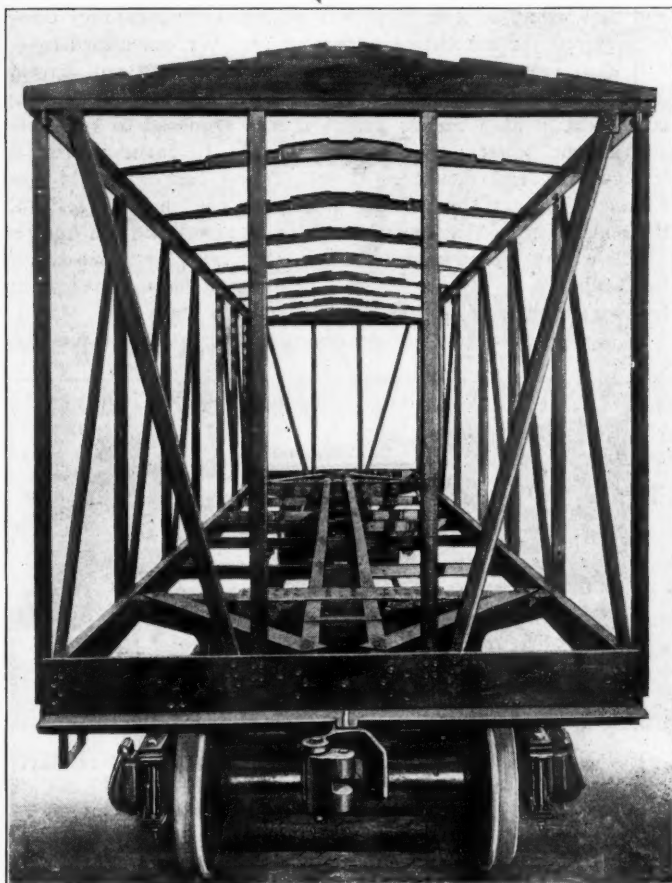


Fig. 11—End View, Framing of Composite, Steel Under-frame Box Car.

found most available in handling work of this character, as machinery is of little avail, except in manufacture.

Freight cars get very rough usage and have to stand severe shocks, and oftentimes these are cornering or diagonal, which at the time may not break the wooden car, but result in its springing back and concealing the damage. The steel frame car under these conditions will sometimes yield and stay bent laterally and act as a tell-tale of unfair usage. There is a considerable question as to how far to go in providing lateral strength and stiffening in a car frame. If we consider the strength required for the vertical stresses of loading and impact, we naturally get a proportion of lateral stiffness from the flanges of the channels or other sections used for sills. The crossbearers, bolsters and fastening of the floor serves to bind the bottom framing so as to give considerable lateral strength. There has been some criticism as to lateral weakness of some steel frame box cars which are amply strong for carrying their load in normal operation, but will not stand

severe cornering shocks without distortion, which occurs between the bolsters. It has been found that in most cases these distorted cars can be jacked back to straight lines without the necessity for cutting them apart, and in view of the cheapness of this class of repair it would seem to indicate a desirable economy in the original construction rather than a justification for an additional expenditure for stiffening the frame.

For instance, if these cars are built with a steel side frame and with two-channel center sills not cover-plated but spacer-bolted and riveted to bolsters, crossbearers and end plates, if the center sills by calculation show sufficient strength for carrying their proportion of load, a cover plate would only give an advantage of a certain amount of lateral stiffness. Such a cover-plate would cost, say \$12 per car, and if we are to build 1,000 cars it amounts to \$12,000 for a partial insurance against lateral distortion, as it would not be a complete one. If we should have a dozen distortions a year, and that would be a large proportion for 1,000 cars, they could be repaired for a hundred dollars or so. We can afford to do this each year for the life of the 1,000 cars, and still have a large proportion of the cost of the cover-plating. During the consideration of a certain design it was proposed to splice the sills at the bolsters as this was thought to favor repairs in the case of end damage. It was found that it would cost \$2 more per car than if the sills were run through solid to the ends. On 1,000 cars this would cost \$2,000 and the number of these cars receiving end damage, the repair of which would be facilitated by a splice in the sills, would be so small as to be insignificant and the expenditure almost a total loss.

It is our conviction, therefore, that simple, direct methods



Fig. 12—N. & W. Composite, Steel Underframe Box Car.

of design, looking towards such strength as may be required for normal operation, with such reserve as may be necessary for waste, wear and corrosion to cover average life, will give best economic results, and to provide for more than that adds unnecessary weight and cost for which there is not adequate return.

The question may be raised that if steel is such a good thing for the frame of a car why not cut out the wood altogether and have a complete steel car? This is undoubtedly true in regard to some classes of cars and in some localities. Results so far obtained with all-steel box cars are not favorable. They are excessively hot in hot weather and to an extent that will damage some classes of lading, and as box cars are required to carry all classes of commodities, this feature is prohibitive of all-steel box cars. In cold weather, or when exposed to great changes of temperature, steel cars will condense the atmospheric moisture and cause the condition called "sweat," and this is also prohibitive on account of many classes of lading, which require clean, dry storage when in transit.

For open cars, to which the above objections do not apply, the choice of all-steel or composite construction is governed by service and cost conditions. On roads serving industries where there is a large proportion of hot lading, as at rolling mills, smelters, etc., when hot materials are frequently loaded

direct into cars, all steel construction is the better proposition. If such conditions do not prevail, then the comparative cost of all-steel and of composite construction, together with consideration of repair facilities, may be taken into consideration. It has been amply proven that the questions of weight, percentage of revenue load, cost and facility of repairs, dura-

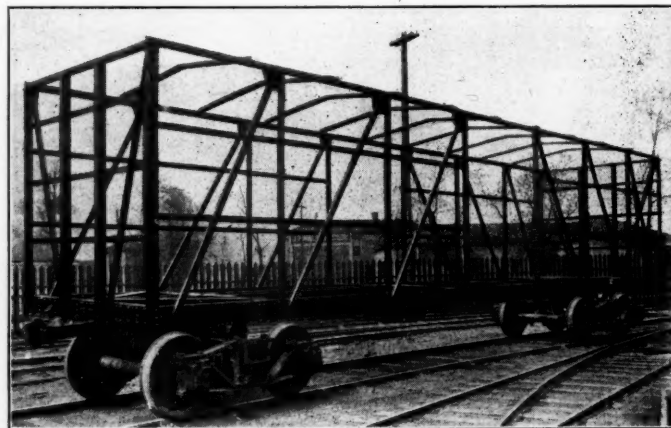


Fig. 13—Side View, Framing of Composite, Steel Underframe Box Car.

bility and general reliability can be as strongly claimed for composite construction as for all-steel when both have an equal weight of other factors affecting the question. Many designs of all-steel cars have given magnificent results, and it is not the intention to detract from their merits. At the same time, having been concerned in the development of the composite construction of freight cars that has grown to considerable proportions, the writer has welcomed this opportunity to present for your consideration some of the features of a very interesting development in railway transportation.

Neither the writer nor anyone connected with the Norfolk & Western made any attempt toward patenting the car designs made by him. It is now several years since they have been public property, and they have been very extensively copied by railways, car companies and others, the only returns to the writer being a sense of satisfaction and pride of achievement as a successful designer. Papers describing and illustrating these theories of car construction have been contributed to the railway press or to railway clubs, some of these being as follows: Paper read before the Richmond Railway Club, May 8, 1902; paper in the *American Engineer and Railroad Journal*, January, 1903; paper read before the Western Railway Club, March 15, 1904; address to students of Purdue University, April 11, 1905.

It is now nearly 10 years since the first developments on the

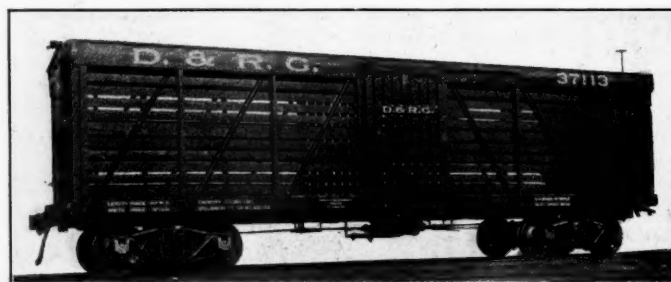


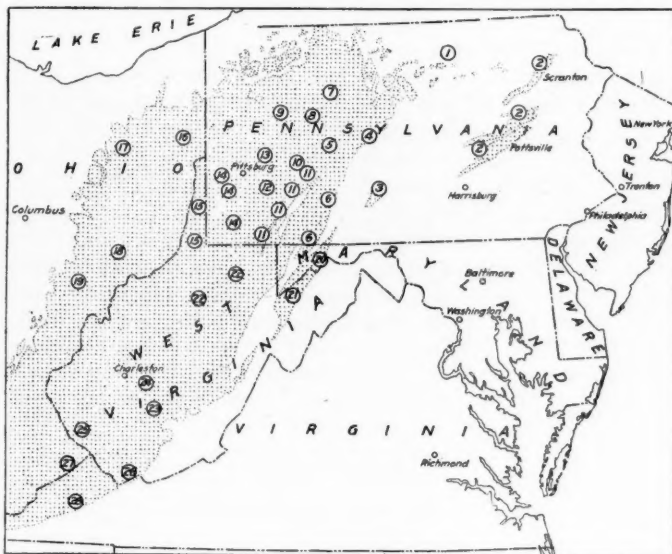
Fig. 14—D. & R. G. Composite Stock Car.

lines described above, and while the freight equipment of the country is still largely of wooden construction, the new cars that are being built are mainly with steel used to a very considerable extent in their framing and the tendency is very considerably on the lines which have been indicated of composite construction.



# THE NORTHERN APPALACHIAN, RHODE ISLAND AND NOVA SCOTIA COAL FIELDS.

The report of the fuel committee of the Boston Chamber of Commerce, portions of which have appeared in previous issues of the *Railway Age Gazette*, describes the coal districts in the Northern Appalachian, Rhode Island and Nova Scotia coal fields. The given production is the approximate



Appalachian Coal Fields of the United States.

average tonnage produced for the past three years, and the number of mines is the approximate number in operation.

## PENNSYLVANIA FIELD.

### NO. 1. TIOGA COUNTY OR BLOSSBURG DISTRICT.

Production, 800,000; number of mines, 15.

Originating railways—Erie; New York Central.

Coal has been mined for many years from this district with but little change in the output. The coal under the trade name of Blossburg has been largely used for smithing purposes. Through rates by the Erie to N. Y., N. H. & H. points.

### NO. 2. ANTHRACITE FIELDS.

Production, 75,000,000; number of mines, 650.

Originating railways—Central of New Jersey; Delaware & Hudson; Delaware, Lackawanna & Western; Lehigh Valley; New York, Ontario & Western; New York, Susquehanna & Western; Pennsylvania Railroad, and Philadelphia & Reading.

The smaller sizes of anthracite, which include No. 2 and 3 buckwheat, bird's-eye and screenings, are the only ones used to any extent in New England for the generation of steam. The size of the mesh through which the coal is passed to get the various sizes of anthracite is given as follows:

- No. 2 Buckwheat or Rice through  $\frac{3}{8}$ -in. diam., over  $\frac{1}{8}$ -in. perforations.
- No. 3 Buckwheat through  $\frac{1}{2}$ -in. diam., over  $\frac{3}{8}$ -in. perforations.
- Bird's-eye through  $\frac{3}{4}$ -in. diameter, over  $\frac{1}{2}$ -in. perforations.

### NO. 3. BROADTOP DISTRICT.

*Includes Bedford and Huntingdon Counties.*

Production, 1,200,000; number of mines, 40.

Originating railways—Huntingdon & Broad Top Mountain, and East Broad Top, which connect with the Pennsylvania.

Most of this coal is used for steam purposes, but some coke is made. Three different seams are mined. This coal is low in volatile, and is used for the prevention of smoke. It is usually more lumpy than other semi-bituminous coal.

### NO. 4. CLEARFIELD DISTRICT.

*Includes Clearfield and Center Counties.*

Production, 7,000,000; number of mines, 230.

Originating railways—Penn.; N. Y. C.; B., R. & P.

The coal coming from the eastern part of this district contains about 15 per cent. volatile, while that from the western part runs as high as 28 per cent. volatile. The production is chiefly from the five seams, and has shown little increase

in the past 20 years. While some of the coal is used for coking, the majority is used as a steam and locomotive fuel.

### NO. 5. CAMBRIA COUNTY.

Production, 13,000,000; number of mines, 180.

Originating railways—Penn.; N. Y. C.; Balt. & Ohio.

The district known as South Fork lies in the southeastern part of this county. Most of the mines are located on the Pennsylvania. There are five seams mined, but the tonnage from the "B" or Miller vein is the largest. There is considerable range in volatile. This coal is generally used for steam and bunkering purposes.

### NO. 6. SOMERSET COUNTY.

Production, 6,500,000; number of mines, 80.

Originating railways—Baltimore & Ohio; Pennsylvania.

The production of coal has greatly increased during the last 10 years.

The Quemahoning district is located in the northwestern part of this county and the Meyersdale in the southern part, near the Maryland line. The coal from the six seams which are being worked is used almost entirely for steam purposes.

### NO. 8. JEFFERSON COUNTY.

*Or the Reynoldsville District.*

Production, 4,700,000; number of mines, 50.

Originating railways—B., R. & P.; Pennsylvania.

This coal is higher in volatile than those lying further east, and is less used in New England as a steam coal. It is much used for locomotives and for power plants requiring a fast burning coal, which are not much restricted in regard to smoke. Three or four seams are worked.

### NO. 10. INDIANA COUNTY.

Production, 6,000,000; number of mines, 70.

Originating railways—Penn.; N. Y. C.; B., R. & P.

Five seams are being worked, and the production has increased rapidly in the last 10 years. The character of the coal is very similar to that mined in the central and western parts of Clearfield county.

### NO. 11. WESTMORELAND COUNTY.

Production, 27,000,000; number of mines, 160.

Originating railways—Pennsylvania; Baltimore & Ohio.

Westmoreland county is divided into three general districts—Connellsville-Latrobe basin, the Greensburg basin and the Western or Pittsburgh district. The coal from the latter is largely used for the manufacture of gas, and therefore not considered in this report. The coal from the other two districts is largely used for making coke, but some of it goes to New England for locomotive fuel and power plants.

There are four groups of freight rates which are not divided according to the mining regions. Group V of Pennsylvania has a \$1.25 rate to Philadelphia (same as the Clearfield, Cambria and Somerset rate), and includes all mines from the eastern part of the county to Latrobe on the Pittsburgh division, and to Tunnelton on the Conemaugh division. Group VI of Pennsylvania, or \$1.35 rate to Philadelphia, applies to all mines on the main line and branches of the Pittsburgh division between Latrobe and Radebaugh, but only to Youngwood on the Southwestern Pennsylvania branch. It also includes the Conemaugh division from Tunnelton and Apollo. Group VII of Pennsylvania, or \$1.50 rate to Philadelphia, applies to all mines in the county on the Baltimore & Ohio, and to those on the Pennsylvania that lie in the district from which coal is shipped for gas purposes. This includes all mines on the Pittsburgh division and branches between Radebaugh and the western county line, as well as New Station, Hunkers and Yukon on the southwestern Pennsylvania branch, and all mines between Vandergrift and Kisiminetas junction on the Conemaugh division. Group VIII of Pennsylvania, or a \$1.65 rate to Philadelphia, applies to the remaining mines of this county, which are located in the lower end of the Latrobe-Connellsville basin.

### NO. 14. PITTSBURGH DISTRICT.

*Includes Allegheny, Washington, Fayette and part of Westmoreland County.*

Production, 72,000,000; number of mines, 350.

Originating railways—Pennsylvania; Baltimore & Ohio; New York Central.

This coal comes largely from the Pittsburgh seam, and is high in volatile. It is little used in New England for steam purposes.

There are two groups of freight rates from this district. Group VII of Pennsylvania, or \$1.50 rate to Philadelphia, applies on coal shipped from all mines on the Pittsburgh division between Westmoreland county line and Wilkesburg. All other mines on the Pennsylvania in Allegheny, Washington and Fayette counties are in Group VII of Pennsylvania, which has a \$1.65 rate to Philadelphia for tidewater shipment. The coal originating on the Baltimore & Ohio takes the same rate as Group VII, but also receives coal from the Pennsylvania in Fayette county known as the Klondike district, where the higher rate of Group VIII applies. Coal originating on the Pittsburgh Terminal Railroad and turned over to the Baltimore & Ohio for tidewater shipment takes the same rate as Group VII.

#### MARYLAND FIELD.

##### NO. 20. GEORGES CREEK.

Production, 4,500,000; number of mines, 65.

Originating railways—Cumberland & Pennsylvania; Georges Creek & Cumberland; Western Maryland.

This coal comes from five or six different seams, but the Pittsburgh seam, or "Big Vein," produces about 70 per cent. of the Maryland tonnage. This vein is from 9 to 14 ft. in thickness, and is also mined in the Pittsburgh, Westmoreland, Connellsville and Fairmont districts and to some extent in Indiana and Somerset counties.

The ash from this coal gives very little trouble from clinker, and the coal has the reputation of being little liable to spontaneous combustion and of being very uniform.

The majority of the coal which goes to New England is shipped by tidewater from Baltimore, Philadelphia and Washington. At the present time coal from the "Big Vein" carries a 15-cent higher freight rate than does the coal from Somerset, Cambria and Clearfield counties, Pa.

#### WEST VIRGINIA FIELD.

##### NO. 21. UPPER POTOMAC.

*Includes Mineral, Grant and Tucker Counties.*

Production, 1,800,000; number of mines, 40.

Originating railway—Western Maryland.

The analyses of coal from this district, given in the report, include the coal from the Georges Creek district, which is mined in seams other than the "Big Vein," while the "Elk Garden" from Mineral county has been included with the Georges Creek. This coal lies in the same basin as the Georges Creek and in character is similar, but the volatile increases towards the southern end of the basin.

##### NO. 22. FAIRMONT DISTRICT.

*Includes Marion and Adjacent Counties.*

Production, 7,400,000; number of mines, 100.

Originating railway—Baltimore & Ohio.

The greater part of this coal comes from the Pittsburgh seam; it contains from 35 to 40 per cent. volatile, and is largely used for the manufacture of gas and as a locomotive fuel. It is, however, little used in New England for steam. The average analyses given show over 2 per cent. sulphur, but in some parts it is much lower.

##### NO. 23. NEW RIVER DISTRICT.

*Includes Raleigh and part of Fayette County.*

Production, 5,500,000; number of mines, 130.

Originating railways—Chesapeake & Ohio; Virginian.

Nearly 50 per cent. of the coal produced in this district goes to New England for steam purposes. The coal varies in volatile from 18 per cent. in the southeastern part to 23½ per cent. in the western part. Three seams are mined, but the majority of the coal produced comes from the Sewell seam.

##### NO. 24. KANAWHA DISTRICT.

*Includes Kanawha and part of Fayette County.*

Production, 7,000,000; number of mines, 200.

Originating railways—Chesapeake & Ohio; Virginian.

Only a small percentage of the coal from here goes to New England. This coal is mined from about 12 seams, and varies from about 24 per cent. to 36 per cent. in volatile. Some of it is used for gas and the rest largely for steam and domestic purposes. The coal shipped to tidewater from mines on the Virginian and the Chesapeake & Ohio east of Carbondale carry \$1.40, or same as New River district, while all other mines have a 10 cent higher freight rate.

##### NO. 25. THACKER DISTRICT.

*Mingo County.*

Production, 1,800,000; number of mines, 40.

Originating railway—Norfolk & Western.

Most of this coal goes west for steam and locomotive fuel. It is high in volatile, about 30 per cent.

##### NO. 26. POCAHONTAS DISTRICT.

*Includes Mercer and McDowell Counties.*

Production, 10,000,000; number of mines, 130.

Originating railways—Norfolk & Western; Virginian.

This coal is similar to that of New River, but as a rule is lower in volatile and sulphur and a little higher in ash. Over 10 per cent. of it is brought to New England by tidewater for steam purposes. Much of it is also used for the manufacture of coke, as the low sulphur makes it suitable for this purpose. Three different seams are mined but the majority of coal produced comes from the No. 3 seam.

About 1,000,000 tons additional are mined in Tazewell county, Va., which belong to this district.

##### NO. 28. CLINCH VALLEY DISTRICT.

*Wise County.*

Originating railways—Norfolk & Western; Carolina, Clinchfield & Ohio.

This is a comparatively new field, and probably never will be a great factor in the New England market, on account of its high volatile, as it contains about 30 per cent.

#### RHODE ISLAND.

While coal was mined from this district almost 100 years ago it has had little bearing upon the fuel supply of New England. At one time this coal was used to some extent for the smelting of foreign copper ore, but for many years the mines have not been operated on a commercial basis. Tests have been made from one car of coal shipped from Cranston to the United States Fuel Testing Plant at St. Louis, the results of which are given in Bulletin No. 332 of the U. S. Geological Survey. [See full page table of analysis, *Railway Age Gazette*, June 24, 1910.]

#### NOVA SCOTIA.

There are three principal producing districts in Nova Scotia: (1) Cape Breton, Inverness and Victoria counties; (2) Pictou county; (3) Cumberland county. Some of the mines are at tidewater, and all are within 30 miles of the coast. The total production is about 6,000,000 tons per annum, and New England receives nearly 12 per cent. of it.

It will be noted that the total production is no more than that of many single counties in Pennsylvania, and a large part of its production will undoubtedly always find a market in Canada. Nevertheless, the manufacturers of New England, and especially those receiving coal at the northern tidewater discharging ports, should consider Canadian coal among the possible fuels and determine its relative price and value. Some manufacturers consider this coal very inferior, having formed their opinion at some such time as the anthracite strike in 1902-03, but the coal received from any district under emergency conditions is not likely to be representative of the coal that is normally produced. Nova Scotia coal contains about 30 per cent. volatile, and while the ash in the slack is higher than most Pennsylvania and West Virginia coal coming to New England, it can be burned in plants properly equipped. The present duty on this coal is 15 cents per ton for slack through ½-in. screen, 45 cents per ton for larger sizes, and 20 per cent. on coke. Before the passage of the Payne tariff law the duty on the larger sizes was 67 cents per ton, while that on slack and on coke was the same as at present.



## General News Section.

The New York, New Haven & Hartford has made an increase of 6 per cent. in the pay of several thousand unorganized employees.

Chicago is one of the great centers of the widespread outcry against railways, although business is leaving Chicago because the railways have been unable to provide for terminal improvements.—*J. J. Hill.*

A press despatch from Montreal says that the officers of the Canadian Pacific have reached an agreement with the employees of that road who, it was announced last week, had refused to accept the award of arbitrators in the matter of wages.

In the offices of the Southern Pacific at Houston, Texas, there are now in use 16 phonographs for recording letters dictated by the officers, taking the place of stenographers. The auditing department has four of the machines; the freight department eight, and the freight traffic department four.

A dozen cases charging various railways of Indiana with violations of the state law concerning safety appliances have just been placed in the hands of the attorney-general by the railroad commission with direction to bring suit to enforce the penalties. Virtually all of the important roads operating in the state are included in the list.

F. W. Whitridge, receiver of the Third Avenue (surface) Street Railroad, New York City, has increased by two cents an hour the pay of all of the conductors, motormen, inspectors and starters employed by the company. In the announcement of this increase of pay, Mr. Whitridge says that the receipts of the company during the past year have been greater than had been expected.

The Interstate Commerce Commission is said to be as anxious as the railways or shippers to have the rate advances agreed to before taking effect, because it already is so far behind the docket that otherwise it could not hope to see daylight for a year longer. A fine precedent will be established if the traffic heads of railways and large shipping concerns can be taught the wisdom of conferring with one another freely in advance of important changes in rates. A long suspense over rates, especially when accompanied by litigation and a free-for-all scolding match, has the same effect upon general business as an impending revision of the tariff.—*Exchange.*

The railways of the southeastern states, following protracted conferences under the guidance of the government mediators, Messrs. Knapp and Neill, have agreed that their conductors and trainmen should have an increase of wages. Following the final conference with the mediators last Saturday the vice-president of the conductors announced the basis of the new rates as follows: The increases will be allowed in two installments. The first is dated back to take effect from July 1 and the other is to go into effect next April 1. The following are the new rates per 100 miles: Conductors of passenger trains from \$2.20 to \$2.50, and on April 1, 1911, \$2.75. Baggage masters from \$1.10 to \$1.35, and later, \$1.55. Passenger flagmen and brakemen from \$1 to \$1.32; later, \$1.50. Conductors of through freights from \$3.18 to \$3.55; later, \$3.75. Brakemen and flagmen on through freights from \$1.75 to \$2.35; later, \$2.50. Conductors on local freights from \$3.80 to \$4.15; later, \$4.25. Brakemen and flagmen on local freights from \$2.30 to \$2.63; later, \$2.75.

A verdict for \$8,000 has been given by a jury in the supreme court of Long Island City to John Kasczak, who sued the Central Railroad of New Jersey to recover damages for the loss of a leg five years ago in a freight yard at Penobscot, Pa. This was the fifth time his suit has been tried. How long are we to have such a state of things? Five trials, and five years, to determine the liability of a railway company to a man who has been run over by a freight train and had his leg cut off! The thing is monstrous, whatever the explanation. No system of law administration can prevent the possibility of error, but

any rational system must see to it that a decision, and a decision on as satisfactory a basis as can reasonably be demanded, shall be rendered in a reasonable time. It is preposterous to drag a case like this out for five years; if the truth of it cannot be properly adjudged in a few months, it cannot be properly adjudged at all. To leave the law's delay what it is in this country is a standing reproach to the nation, and especially to the legal profession.—*Evening Post*, New York.

### Wages on the Pennsylvania.

The conductors and trainmen of the Pennsylvania Railroad are asking for increased pay, and it is said that votes are being taken in both of the brotherhoods. The men frankly say that the Pennsylvania heretofore has paid higher wages than can be had on other roads, and that this policy ought to be continued. The company, in reply, asks them if it is fair that, because of this good treatment accorded the men in the past, the company should now be punished. In the past, the company has treated its employees "as liberally as its finances would permit." Now other roads have brought their rates of pay up more nearly to a parity with those on the Pennsylvania; but the Pennsylvania, on 90 per cent. of its traffic has to compete with these other roads.

The Philadelphia *Public Ledger* commenting on the situation says:

"Of course, it is well understood that the attitude of the Pennsylvania Railroad management with respect to certain of the demands of the railway brotherhoods which affect the question of authority and discipline is a tender point with the labor leaders, and there is always the possibility that a lack of tact or good judgment on either side in the adjustment of some minor differences may precipitate a struggle over the major question now kept in the background. . . . The existing differences as to the trainmen's hours and wages present no justification for a strike, and if one should be declared the men would be totally in the wrong from the outset."

### Railway Travel in Turkey.

There is a very interesting railway ride from Salonika to Constantinople, but you have to get up at 4 o'clock in the morning. Nevertheless, there are compensations. The scenery through the Rhodopo Mountains and along the shore of the Aegean Sea is picturesque. For 20 miles or more the track follows the gorgeous canyon of the Karosha river, which will remind you of the Royal Gorge in Colorado. Although there is a prejudice against Turkish railways as a rule, the line from Salonika to Constantinople is beyond criticism, so far as construction and equipment are concerned. Everything is new—new cars made in England that are very comfortable; new locomotives made in Germany, new stations, clean and neat, and the track is first class, with 60-lb. rails and steel ties. The schedule, however, is very slow. It took us more than 25 hours to make a little more than 300 miles. However, you never get tired of watching the Turks. They are very entertaining people. There were many Turkish women traveling, all wrapped up in shawls and veils. The conductor turned six men out of a compartment and made them hunt other places on the train because a veiled lady appeared at one of the stations with a second-class ticket. And the men submitted with resignation, although some of them were compelled to stand up until places were vacated at stations farther on. There were many veiled women traveling third class, usually attended by some man. When a Turkish woman boarded or left the train she usually had 40 curious looking bundles thrown in or out after her. There were eating stations at several places, and bread, hard-boiled eggs and fresh lettuce are peddled at every stop. We were forcibly reminded of the revolution in Albania by the train loads of soldiers that we met at almost every station between Salonika and Constantinople. The insurrection is supposed to have been entirely suppressed, but there were guards at all the tunnels along the rail-

way and at all the bridges, and looking out of the window as the train swept by there was almost always a sentinel patrolling the right of way to keep the track from being blown up by the Albanians, who would like nothing better than to send a train load of Turks to eternity with dynamite.—*Chicago Record-Herald*.

#### The Union Station Situation at Chicago.

Plans for the new Union station in Chicago have not yet been decided on. By interviews with officers of the lines directly interested it has been learned that while tentative plans have been agreed on and it is believed that an expenditure of about \$25,000,000 ultimately will be made, matters are a long way yet from settlement.

Some of the roads are merely tenants of the building now used. The Pennsylvania proposes that all the roads using the new station shall become joint owners of it. This would involve deeding of certain land now owned by these tenant roads, and in view of the fact that the property in question is extremely valuable and is in different parts of Chicago, speedy action is not expected.

A new complication has been developed by the opposition of the Chicago Association of Commerce to a permit for bridge spans of 140 ft. over the Chicago river. A minimum clear span of 200 ft. is demanded, which may involve the reconstruction of a number of bridges already spanning the river, and would compel the Pennsylvania to give up 60 ft. of the proposed station grounds on which to build abutments for a bridge at Van Buren street. This would practically mean the narrowing of the station site by cutting off a strip 60 ft. wide along the entire length.

It is believed that the question of the bridge spans will be settled shortly, and with this complication removed the way to an early agreement on the question of joint ownership would be somewhat cleared. The roads interested are the Pennsylvania Lines West, the present owner; and the Chicago, Milwaukee & St. Paul, the Chicago & Alton and the Chicago, Burlington & Quincy, tenants.

#### A Call for Railway Poetry.

Professor John A. Lomax, of the English Department of the Agricultural and Mechanical College of Texas, College Station, Tex., acting for Harvard University, has set out to gather and publish the folk-songs of the United States; and he asks the assistance of old-timers and others who know of such songs which have not been published. Professor Lomax appeals to miners, lumbermen, sailors, soldiers, fishermen and all classes who have lived in primitive isolation or who have knowledge of such life in the early days of the country. He expects to find that there are many ballads which people familiar with them might send to him if they would. As a suggestion of what he wants he has issued a circular giving the titles of some of the songs that he has already got track of, but the only one which he mentions that has any connection with railroading is "Jerry, Go He That Car." Mr. Lomax particularly requests readers of the *Railway Age Gazette* to send him copies of any old ballads that concern the life of the railway man.

#### Tests of Timber Beams.

The Engineering Experiment Station of the University of Illinois has issued Bulletin No. 41, covering tests of timber beams. The investigation was undertaken to obtain information on the structural properties of full-size timber beams as used in railway bridge practice; the results are applicable to timbers which may be employed in all forms of building construction. The tests include 112 full-size stringers and several hundred smaller test pieces cut from these stringers. The woods tested were long-leaf pine, short-leaf pine, loblolly pine and Douglas fir. The tests involved natural and creosoted timber. In general, the results of the tests show that defects such as knots, cross grain and seasoning checks have a very marked effect upon the strength of large timber beams. The tests also show that many of the values given in engineering literature for the strength of timber are much too high for sticks of structural size. They emphasize the futility of using the results of tests of small sticks of selected material as a criterion of the

strength of timbers of large size. The preponderance of failures in horizontal shear is marked, and considerable information on shearing resistance of wood is given. A careful analysis of the stresses and deformations in the timbers tested is given. Numerous diagrams and reproductions of photographs and several summarized tables assist in giving a comprehensive view of the tests and methods employed. Copies of Bulletin No. 41 may be obtained gratis on application to W. F. M. Goss, director of the Engineering Experiment Station, University of Illinois, Urbana, Ill.

#### Disastrous Collision at Middletown, Ohio.

In a butting collision between a southbound passenger train and a northbound freight on the Cincinnati, Hamilton & Dayton at Middletown, Ohio, on Monday, July 4, twenty-two passengers and one brakeman were killed, and three trainmen and 37 passengers were injured.

The passenger train was the Cincinnati part of the Twentieth Century Limited Express of the Cleveland, Cincinnati, Chicago & St. Louis, which was running over the C., H. & D. because of a blockade on the C., C., C. & St. L. The press despatches indicate that the cause of the collision was the failure of the passenger train to wait at Poast Town, three miles north of Middletown; but the statements are not clear. The passenger train was in charge of a pilot man of the C., H. & D., who was seriously injured. The freight train was running slowly, but the passenger train was running fast, and as the scene of the collision was on a curve, the men in the engines had barely time to jump off. Most of the persons killed and injured were in the combination car and the day coach, which were next to the engine of the passenger train. The engines were completely wrecked, and a heavy steel coal car, which was next to the engine of the freight train, crushed the combination car. The second car of the freight contained heavy 6-inch timbers, and these were forced into and through the day coach.

#### Hearing on Alleged Frauds Against Illinois Central.

A master in chancery has been taking testimony at Memphis, Tenn., in the suit brought by the Illinois Central against the Memphis Car Company for alleged frauds against the road in connection with the repair of cars. T. H. Brebach, formerly secretary-treasurer of the Memphis Car Company, has been thus far the principal witness. Among other things he said that several car inspectors and other employees of the Illinois Central were on the pay-roll of the Memphis Car Company also. He admitted that several cars of lumber destined to the shops of the railway were diverted to the car works, but could not testify as to whether numerous kegs of nails, bolts, etc., consigned to the railway in care of the car company had been used by the shop and charged to the road. It is alleged that by overcharges for repair of cars the Memphis Car Company defrauded the Illinois Central out of about \$300,000.

#### Railways in Japan.

In November, 1909, the through railway line from Moji, Japan, to Kagoshima was completed, and Kagoshima, the most southerly city of the island, can now be reached from Tokio in about 46 hours. The portion of the line just opened from Hitoyoshi to Yoshimatsu, 20 miles, is a part of the Higo-Satsuma section extending from Yatsushiro to Kagoshima, 94 miles. This section has presented great engineering difficulties. The greatest gradient on the line, between Yatsushiro and Yoshimatsu, is .35, and for the first time in the history of Japanese railway engineering, the loop system has been adopted. The main difficulty was the construction of the Yatake tunnel, 6,877 ft. long, which occupied over three years. The Higo-Satsuma section has 60 tunnels (with a total length of 53,493 ft.), 89 bridges (7,460 ft.) and 199 culverts. The total cost was about \$8,000,000. The total length of the lines of railway in Kiushiu open to traffic is 497 miles, all state owned.

#### Society of Railway Financial Officers.

It has been decided to hold the next annual meeting of the society at the Hotel Chamberlin, Old Point Comfort, Va., on October 25 and 26.



## MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.  
 AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.  
 AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—C. M. Burt, Boston, Mass.; next meeting, St. Paul, Minn.  
 AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASS'N.—G. W. Dennison, Penna. Co., Toledo, Ohio.  
 AMERICAN ASS'N OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew Bldg., Cincinnati, Ohio.  
 AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York.  
 AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago; Oct. 18; Fort Worth, Tex.  
 AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASS'N.—E. H. Fritch, Monadnock Bldg., Chicago  
 AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L. S. W. Ry., St. Louis.  
 AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Building, Chicago.  
 AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—O. T. Harroun, Bloomington, Ill.; July 12; Chicago.  
 AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.  
 AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.  
 AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 29th St., N. Y.; 2d Tues.; New York.  
 AMERICAN STREET AND INTERURBAN RAILWAY ASS'N.—H. C. Donecker, 29 W. 39th St., New York; Oct. 10-14; Atlantic City.  
 ASSOCIATION OF AM. RY. ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.  
 ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A. T. & S. F., Topeka, Kan.  
 ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wis. Central Ry., Chicago  
 ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Pl., New York.  
 BUFFALO TRANSPORTATION CLUB.—J. N. Sells, Buffalo.  
 CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.  
 CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; Thursdays; Montreal.  
 CAR FOREMAN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month; Chicago.  
 CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.  
 ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.  
 ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton Building, Pittsburgh; 1st and 3d Tuesdays; Pittsburgh.  
 FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R.R., Richmond, Va.  
 GENERAL SUPERINTENDENTS' ASS'N OF CHICAGO.—H. D. Judson, 209 Adams St., Chicago; Wednesday preceding 3d Thurs.; Chicago.  
 INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.  
 INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.  
 INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, D. & I. R. Ry., Two Harbors, Minn.  
 INTERNATIONAL RAILWAY MASTER BLACKSMITHS' ASS'N.—A. L. Woodworth, Lima, Ohio; Aug. 16-18; Detroit, Mich.  
 INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, rue de Louvain, 11, Brussels; July 4-16; Berne, Switzerland.  
 IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month, except July and August; Des Moines.  
 MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.  
 NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.  
 NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.  
 NORTH-WEST RAILWAY CLUB.—T. W. Flanagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.  
 NORTHERN RAILWAY CLUB.—C. L. Kennedy, C. M. & St. P., Duluth; 4th Saturday; Duluth, Minn.  
 OMAHA RAILWAY CLUB.—A. H. Christiansen, Barker Bldg.; 2d Wed.  
 RAILWAY CLUB OF KANSAS CITY.—C. Manlove, 1868 Walnut St., Kansas City; Third Friday in month; Kansas City.  
 RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month, except June, July and August; Pittsburgh.  
 RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.; annual, Oct. 11; Richmond, Va.  
 RAILWAY S'KEEPERS ASS'N.—J. P. Murphy, Box C., Collinwood, O.  
 RICHMOND RAILROAD CLUB.—F. O. Robinson; 2d Monday; Richmond.  
 ROADMASTERS' AND MAINTENANCE OF WAY ASS'N.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; annual, Sept. 13-16; Chicago.  
 ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.  
 SOCIETY OF RY. FINANCIAL OFFICERS.—C. Nyquist, La Salle St. Station, Chicago; Oct. 25 and 26; Hotel Chamberlin, Old Point Comfort, Va.  
 SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. R. Ry., Montgomery, Ala.; annual, Oct. 20; Atlanta.  
 SOUTHERN & SOUTHWESTERN R.R. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., Mar., July, Sept. and Nov.; Atlanta.  
 TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August; New York.  
 TRAIN DESPATCHERS' ASS'N OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago.  
 TRANSPORTATION CLUB OF TOLEDO.—L. G. Macomber, Woolson Spice Co., Toledo.  
 TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo; annual meeting; Aug. 16-19; Niagara Falls, Ont.  
 WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg; 2d Monday, except June, July and August; Winnipeg.  
 WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; Wednesdays, except July and August; Chicago.

## Traffic News.

The Interstate Commerce Commission has approved an increase of one cent per 100 lbs. in the rates on flour from Buffalo to the Atlantic Seaboard.

The Interstate Commerce Commission will give a hearing at Washington next Tuesday on the complaints against recent advances in commutation passenger fares to and from New York City.

Agents of the National Railways of Mexico have announced the discontinuance of through bills of lading from points in the United States for shipments going either by land or water; and the Mexican lines are also demanding a high proportion of through rates on freight.

The offices of the traffic manager and general freight agent and of the general passenger agent of the Long Island Railroad Company will be located on the third floor of the Pennsylvania station, New York City, entrance on Eighth avenue, between Thirty-first and Thirty-third streets.

The New York Central has begun suits in court against fifty hotel proprietors and other persons in towns near New York City who have been speculating in commutation tickets, selling single rides at prices in advance of the rate paid, yet below the regular single ticket fare as charged by the railway.

For the Appalachian Exposition, to be held at Knoxville, Tenn., September 12 to October 12, the railways of the South have announced coach excursions, to be run two days in the week throughout the month, at fares of about one cent a mile; and excursion tickets good for ten days and good also in sleeping cars at a cent and a half a mile.

The Trunk lines have filed with the Interstate Commerce Commission freight tariffs, to take effect August 1, increasing the rates to all western points from the basis of 75 cents per 100 lbs., New York to Chicago, to 90 cents. The railways in the Central Traffic Association territory have filed similar increases to eastern points. Some of the changes are: Cincinnati to New York (first class) old 62.9 cents, new 76; Chicago to New York, old 75, new 90; Chicago to New York (Lake & Rail) old 63, new 78; Chicago to Buffalo, Pittsburgh, etc., old 45, new 54.

An officer of the New York Central, not named, is quoted in a newspaper interview to the effect that the time taken by the Interstate Commerce Commission to decide to approve an increase in the freight rate on flour from Buffalo to the Atlantic seaboard has cost his company \$250,000; that is to say, the commission has now justified an advance, which ought to have been made several months ago. "Why," says this officer, "should not we call on the shippers for reparation, as they do on us when the commission decides that we have been charging rates which are too high?"

The Ohio railway commission has rejected tariffs filed with it by the railways in that state providing for advances in rates. It is stated that it has also notified the roads that under no circumstances will the higher rates be authorized. The commission charges that the roads by these increased state rates would virtually violate the agreement entered into with President Taft that they would not raise any interstate rates until the law had given the Interstate Commerce Commission power to pass on advances in rates. The proposed state rates were to go into effect on August 1. The commission denounces some of them as "preposterous."

The Interstate Commerce Commission has refused to suspend Official Classification No. 36, which was issued by the trunk lines and went into effect July 1. Press despatches say that the Commission has been overwhelmed with protests from shippers against this classification. There are in it, however, only twenty-eight reductions and thirty advances. The Commission says: "The principal increases are the carload minimum of horse vehicles from 10,000 to 11,000 lbs., and an advance in the classification of automobiles from first-class to 110 per cent. of first-class, and the Commission is not satisfied that these items should be suspended. This ruling, however, will not prevent or delay the hearing of any complaint which has been made or may be

made against the reasonableness of these or any other increases effected by the new classification."

The Rock Island and the St. Louis & San Francisco have recently restored most of their passenger rates in Missouri and Oklahoma to a 3-cent basis. It will be recalled that when the federal court in Missouri granted the railways an injunction restraining the officers of the state from enforcing the 2-cent fare law, some of the roads adopted the 2½-cent rate, while others adopted a 3-cent rate. The roads which adopted the 2½-cent rate were the Rock Island, the Frisco, the Alton and the Burlington. The restoration of the 3-cent rate by the Rock Island and the Frisco almost completes the restoration of all passenger rates in these states to the 3-cent basis. The roads are giving passengers claim coupons, so that if the litigation goes against them passengers can recover the difference between the rate they pay and the 2-cent rate.

Shippers at Chicago, St. Louis and other cities in Central Freight Association territory are joining with the western railways in asking the supreme court of the United States to rehear the arguments in the Missouri river rate case. One of the petitions is filed by nine merchants and manufacturers at Chicago, including such large houses as Sprague, Warner & Company and Carson, Pirie, Scott & Company. They say that the court failed to appreciate the fact that the rates from the seaboard to the Missouri river and to Denver are not single through rates, but are made by the combination of separate and distinct rates, those from the seaboard to the Mississippi river and from the Mississippi river to the Missouri river; those from the Seaboard to Chicago and from Chicago to the Missouri river, etc. They point out that the decisions of the commission in the Indianapolis case and the Denver case, as well as the Missouri river case, show that it intends to apply rigorously its so-called "familiar rule," that in transportation over two connecting but separate railways the rate for a haul over both lines should be less than the sum of the rates for the two hauls, and that the application of this principle is, on its face, a discrimination against the petitioning shippers and in favor of those at the Atlantic seaboard and on the Missouri river. "To refuse a hearing," it is asserted, "on the merits of these claims and to send the petitioners for their possible adjustment to the commission is, under the facts of this case—and we say it with the deepest regret—a denial of a hearing in the matter in which, under the order of the commission, their property is taken from them."

#### The Rock Island's Agricultural Commissioner.

Prof. H. N. Cottrell, for many years director of farmers' institutes at the Kansas and Colorado agricultural colleges, has been appointed agricultural commissioner of the Rock Island lines. In this office he will work in close harmony with the immigration department, and will keep in touch with conditions throughout the territory in which the Rock Island operates. He will devote himself to disseminating information as to the crops best adapted to different localities, and will hold meetings with farmers to discuss every important subject of mutual interest. A circular which the Rock Island has issued says: "His services are at the disposal of all without cost to any. Every farmer with a problem upon which he needs help, every settler who

needs advice as to what he should plant and when he should plant it, will find in the Rock Island's agricultural commissioner the kind of co-operation which is really practical and of immense value. While Mr. Cottrell's headquarters will be in Chicago, his time will be spent in traveling throughout the Rock Island's territory in the interest of those who require his services."

#### Conference on Rate Differentials at St. Louis.

A long conference was held at St. Louis on June 30 by the committees appointed by the railways, the municipal assembly and the shippers to negotiate regarding the rate differentials within the 100-mile zone. The representatives of the shippers and of the municipal assembly contended strongly for the complete abolition of the so-called bridge arbitraries, but the representatives of the railways showed no signs of granting this demand.

#### Condition of the Cotton Crop.

The crop reporting board of the department of agriculture estimates that the condition of the cotton crop on June 25 was 80.7 per cent. of a normal, as compared with 82.0 on May 25, 1910; 74.6 on June 25, 1909; 81.2 on June 25, 1908, and 79.5 the average of the past ten years on June 25.

##### Comparisons of Conditions, by States.

States.	1910		1909.	June 25 1908.		10-yr. av.
	June 25.	May 25.		June 25.	1908.	
Virginia	81	90	76	92	83	
North Carolina	72	84	75	89	82	
South Carolina	75	78	77	84	80	
Georgia	78	81	79	83	80	
Florida	82	80	88	84	85	
Alabama	81	83	64	82	78	
Mississippi	81	82	61	84	78	
Louisiana	77	76	62	80	79	
Texas	84	83	79	80	79	
Arkansas	77	81	76	85	81	
Tennessee	82	86	80	89	84	
Missouri	80	87	83	87	83	
Oklahoma	88	84	84	64	82	
California	95	90	..	..	..	
United States	80.7	82.0	74.6	81.2	79.5	

For the purpose of comparison, the condition of the cotton crop in the United States monthly for the past ten years is given below:

Years.	May 25.	June 25.	July 25.	Aug. 25.	Sept. 25.
1909	81.1	74.6	71.9	63.7	58.5
1908	79.7	81.2	83.0	76.1	69.7
1907	70.5	72.0	75.0	72.7	67.7
1906	84.6	83.3	82.9	77.3	71.6
1905	77.2	77.0	74.9	72.1	71.2
1904	83.0	88.0	91.6	84.1	75.8
1903	74.1	77.1	79.7	81.2	65.1
1902	95.1	84.7	81.9	64.0	58.3
1901	81.5	81.1	77.2	71.4	61.4
1900	82.5	75.8	76.0	68.2	67.0

#### Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association, in presenting statistical bulletin No. 73-A, giving a summary of car shortages and surpluses by groups from February 17, 1909, to June 8, 1910, says:

"There is a decrease of 3,864 in the surplus, bringing the total

##### CAR SURPLUSES AND SHORTAGES.

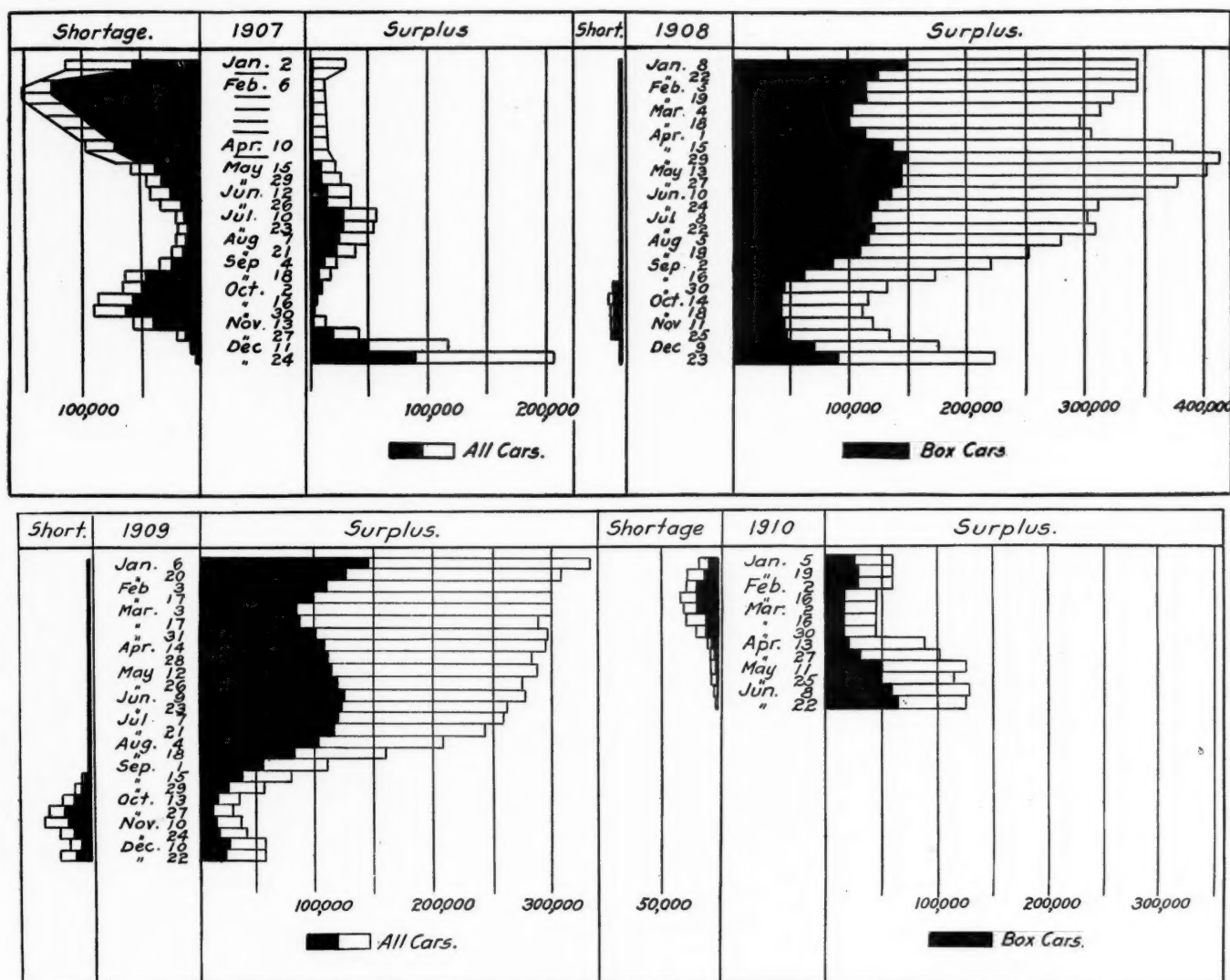
Date.	No. of roads.	Surpluses				Shortages			
		Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Box.	Flat.	Coal, gondola and hopper.	Other kinds.
Group *1.—June 22, 1910.	8	60	.....	634	84	113	172	10	.....
" 2.—" 22, 1910.	23	11,897	291	8,854	12,139	4	36	2	4
" 3.—" 22, 1910.	22	18,702	436	8,742	3,761	.....	115	185	189
" 4.—" 22, 1190.	9	1,920	1	297	1,035	39	366	400	.....
" 5.—" 22, 1910.	19	3,156	188	439	1,211	48	80	315	10
" 6.—" 22, 1910.	21	7,497	369	2,553	4,590	9	.....	9	101
" 7.—" 22, 1910.	3	1,237	65	47	547	.....	.....	.....	.....
" 8.—" 22, 1910.	15	7,205	300	5,115	2,956	2	20	.....	2
" 9.—" 22, 1910.	11	1,642	407	179	569	.....	.....	.....	3
" 10.—" 22, 1910.	22	5,077	846	1,887	6,285	8	46	3	101
" 11.—" 22, 1910.	5	1,236	244	15	857	300	27	.....	.....
Total	158	59,611	3,237	28,762	34,034	523	862	934	410
					125,644				2,729

\*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland, and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan, and Western Pennsylvania lines; Group 4—West Virginia, Virginia, and North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota, and North and South Dakota lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



down to 125,644 cars. Box cars increased 3,474, while coal cars decreased 1,589. Miscellaneous decreased 5,487, due principally to an increased demand for coke cars in the eastern and middle groups and for stock cars in the West and Northwest."

Chicago to Spokane were unreasonably high, and named certain class rates which would, in its opinion, be reasonable. The railways were then required to submit a scheme of rates for the approval of the commission, which they have now done.



Car Surpluses and Shortages in 1907, 1908, 1909 and 1910.

The table gives car surpluses and shortages by groups for the latest period covered by the report, and the chart shows total surpluses and shortages bi-weekly since 1907.

#### A Cheerful Prospect.

The July tariff bulletin of the Indiana State Railroad Commission contains a warning to all shippers of the state to place little, if any, faith in any tariff sheets which they may have at hand at the time shipments are made. In such a chaotic condition is the question of rates in Indiana as well as other states that the commission declares that a rate sheet received by the last mail may be entirely wrong and liable to lead the shipper into all sorts of confusion if he uses it as a basis for making prices on goods on which he pays the freight. The commission continues to be deluged with new tariffs on class freight, notices of changes and exceptions to class rates, and there is yet to come the great mass of commodity rates.

#### INTERSTATE COMMERCE COMMISSION.

##### Reductions Ordered to Spokane.

*City of Spokane, Wash., et al., v. Northern Pacific et al.*  
Opinion by Commissioner Prouty.  
In disposing of the original *Spokane case*, 15 I. C. C. Rep., 376, the commission held that the class rates from St. Paul and

To determine whether the scheme of the defendants shall be approved we must first understand clearly what that scheme is.

It was claimed by the defendants, and found in the original decision that rates from eastern points of origin to Pacific coast terminals were induced by water competition. While these terminal rates are influenced by, they did not fully meet this competition by sea, since large quantities of traffic still move to all Pacific coast terminals by the various water and rail-and-water routes from the Atlantic seaboard. The defendants, in constructing their plan, started out with the assumption that rates 25 per cent. lower than the present rates would be required to fully meet this sea competition.

Traffic from the Atlantic seaboard to an interior destination, like Spokane, may move by water to a Pacific coast terminal, like Seattle, and from that terminal by rail, the through rate being the sum of the water rate to Seattle and the rail rate from Seattle. A rate from the eastern point of origin to Spokane, which fully met water competition at Spokane, would be constructed, therefore, by taking the water competitive rate to the terminal and adding to it the full local from the terminal to the interior point.

It was claimed by the coast cities in this proceeding, and is being insisted upon by them in other proceedings, that the present rates eastbound from these terminal points are unreasonable, and the carriers apparently concede that these rates must be reduced. For the purpose of constructing the proposed rates to Spokane, not the present local, but a rate 16% per cent. less

than the local, was used. Spokane rates are therefore constructed by taking 75 per cent. of the terminal rate from eastern territory and adding thereto a rate which is 16% per cent. less than the present local rate from Seattle to Spokane.

The rate thus created is applied from Chicago. From the Mississippi river the same rate is established, but from the Missouri river the rate is about 10 per cent. less. The theory of the defendants seems to be that ordinarily the cost of producing commodities sold in Spokane is somewhat greater on the Missouri river than in the vicinity of Chicago and St. Louis, and that therefore a somewhat less freight rate should be made to equalize the cost of laying down the article in Spokane. In cases where this is not true or where the reverse is true, the rate from the Missouri river is the same as from Chicago and the Mississippi river.

The idea seems to be that so long as Spokane can purchase either at Chicago or at some more easterly point it shall purchase at Chicago, but that if it cannot buy in Chicago territory then it shall be given a rate which will enable it to buy in the same market with its competitor at Seattle or Portland.

The complainants object to this proposed scheme of rates upon two principal grounds:

It is said that the proposed rates are not as favorable to the jobbers of Spokane, in comparison with the rates enjoyed by their competitors at the coast cities, as the present rates. It will be found on examination that this is not, on the whole, true.

Even if the contention of the complainants in this respect was true, it would not be conclusive against the approval of the proposed schedule. It must be remembered that the present rates are the result of a deliberate attempt to carve out a certain territory in which the jobber of Spokane should have the advantage in rates over his competitor upon the coast or elsewhere.

The second objection of the complainant is that the proposed rates are no substantial reduction from the present rates. This is hardly true. The proposed rates afford a very substantial reduction from the rates now in effect. In many cases they are less than rates would be if established on the basis adopted by the commission. The most serious objections to this scheme from our point of view are not those urged by the complainants and interveners. The rate constructed as above detailed is applied from Chicago to Spokane. Why should this be applied from Chicago rather than from New York or from the Missouri river? The rate is constructed by taking 75 per cent. of the terminal rate, and this terminal rate applies to the coast from all territory east of the Missouri river. It is said that this blanket rate from eastern territory to Seattle has been forced by water competition. Now, if 75 per cent. of this rate is necessary to fully meet water competition and if the theory of this scheme of rate making is to meet water competition at Spokane, why should not the rate which results from the addition of the local rate to Spokane be made to apply from all eastern territory? In other words, why does not water competition require the same blanket rate from eastern territory to Spokane which it produces at Seattle?

The defendants were asked this question and answered in substance that logically this might be true, but that in meeting this water competition the defendants were at liberty to meet it in whatever way and at whatever point and to whatever extent they saw fit. This cannot be admitted.

When the commodity originates both at Chicago and at New York, so that the Spokane buyer can purchase in either market, he is compelled to pay the local rate from New York to Chicago, which means that he must ultimately buy in Chicago rather than in New York. If the commodity can be purchased only in New York, then the rate from Chicago is made lower than it otherwise would be, for the purpose of permitting the Spokane merchant to purchase upon the Atlantic seaboard. The manifest purpose of this is to compel Spokane to buy in the middle west, that being in the interest of the defendant carriers.

The scheme of the defendants assumes that water competition exists at Spokane which must be met. The testimony in this record fails to disclose the existence of such competition to any appreciable extent. While a reduction in the rates from the coast to Spokane would tend to stimulate the movement of traffic through Seattle and Tacoma, still it does not appear probable that such a movement could ever assume considerable

proportions, even with the present westbound rates to Spokane.

This scheme of the defendants therefore is founded on facts which do not exist, is constructed on a theory which cannot be approved, and is of no assistance in solving the general problem before the commission. While we recognize that these defendants have made an honest effort to meet the situation, by the construction of these schedules, we are constrained to withhold our approval.

If the rates suggested by the defendants are not to be approved, what rates shall be established by the commission?

The original complaint attacked the class rates from St. Paul and Chicago to Spokane, and in our decision we held that the existing rates were unreasonable and fixed certain lower rates for the future. The complaint also named some 34 different commodity rates which were alleged to be excessive. We held that these rates were unreasonable and established lower rates as substitutes. The complaint contained a statement that all rates from St. Paul and Chicago to Spokane were unreasonable, but we held that a general allegation of this kind could not lay the foundation for an order reducing those rates; that there must be a specific attack upon each specific rate, which would put the defendant upon notice of the exact thing complained of. We therefore declined to express any opinion or to make any order as to the great mass of commodity rates.

The complainant has now filed a supplemental petition in which it attacks in detail 580 commodity rates. In the hearing at Spokane each one of these items was taken up by itself and particularly investigated. The commission is therefore in a position to determine what are reasonable rates upon these commodities. Both parties are highly dissatisfied with the few commodity rates which were fixed by the commission. The complainants renew, with great earnestness, their claim that no rate should be permitted at Spokane which exceeds the rate to Seattle. We have, however, on full consideration, held that, under the decisions of the Supreme Court of the United States, the Seattle rate cannot be made the measure of the Spokane rate; that our only power is to establish rates to Spokane which are just and reasonable under all the circumstances, and to this ruling we must adhere.

The defendants urge that our decision, carried to its legitimate conclusion on the whole commodity list, in view of reductions which must elsewhere result, will be disastrous. They further show that since the submission of the original case large expenditures have been made on their properties, which, of itself, might well call for a reconsideration of the conclusions reached upon the record as it then stood.

In the former hearing the Northern Pacific and the Great Northern companies attempted to show the cost of reproducing their respective properties. This testimony was given as of the spring of 1907. The Northern Pacific now shows that since then it has expended approximately \$93,000,000, while the Great Northern shows an expenditure of approximately \$75,000,000. These sums would in each case equal approximately 25 per cent. of the entire cost of reproduction as found by the commission, and would, if not accompanied by increased earnings, perhaps justify the claim to a greater return.

An examination of the nature of these expenditures does not, however, lead to the conclusion that they can have any legitimate bearing upon the correctness of our former decision. While some small part of the outlay is on the property, the cost of reproducing which was given in the former case, the great bulk of the expenditure is not.

For example, the Northern Pacific shows that it has expended since 1907, \$15,000,000 for new equipment. The former testimony showed that the equipment of this company was sufficient for the performance of the service from which its revenues had resulted. Large sums had been charged against the depreciation of that equipment. It was carried into the estimate of value at substantially the figures put on it by the engineers of the Northern Pacific itself. If that company has since then expended this large amount in the acquiring of new equipment, it must have been in contemplation of new business which will yield additional revenues at the former rates.

The same remark applies to the large expenditures shown in the construction of branch lines.

The Northern Pacific and Great Northern have each advanced in the construction of the Spokane, Portland & Seattle some \$25,000,000, which is a part of the total expenditure above named.

This railway has been constructed jointly by these two com-



panies. While it does not definitely appear, it is our understanding that it is to be operated as an independent proposition. It has just been opened for business, and up to the present time its earnings are small. This property, like the new equipment of the Northern Pacific and its branch lines, ought to be worth what it has cost and ought to earn a return upon that amount. Certainly the patrons of the Northern Pacific and the Great Northern should not be taxed on account of the construction of this railway.

A word of explanation should perhaps be given as to the use which has been made or should be made by the commission, in the fixing of these rates, of this testimony as to the value of the properties involved.

The defendants assumed in the argument of this case at Spokane and again in the argument of the *Reno and Salt Lake cases*, 19 I. C. C. Rep., 218 and 238, that the commission had reduced the rates to Spokane because it found that the revenues of the carriers were excessive and for the purpose of reducing those revenues. This is an entire misconception both of the purpose and of the effect of our inquiry into the financial operations of these companies.

The complaint was that the rates of the defendants to Spokane were unlawful, first, because they were higher than corresponding rates to more distant points, and, second, because they were excessive in and of themselves. There is no better way to convey an accurate idea of the exact question presented than by giving instances of actual shipments from the expense bills, great numbers of which were introduced by the complainants on the hearing.

On a carload of drugs shipped from New York to Spokane, carriers from New York to Chicago, 900 miles, received \$139.53; from Chicago to St. Paul, 400 miles, \$59.69; and from St. Paul to Spokane, 1,500 miles, \$543.48; a total of \$742.70. Had this carload been moved through Spokane and over the Cascade mountains to Seattle, 375 miles further, the total charges would have been \$556.12, and the receipts of the defendants for the haul of 1,875 miles from St. Paul to Seattle, \$356.90.

The attack of the complainants was not upon a single rate nor on a comparatively small number of rates, but on the entire schedule from the east to Spokane.

Before these rates, involving as they do whole schedules, can be reduced, we must decide whether the result will be to deprive the defendants of a fair return on their property. A considerable part of the discussion necessarily centered around this issue, which was, in that sense, a controlling one. But the purpose of that discussion was not to ascertain whether rates should be reduced, but whether they could be reduced.

The commission held that the earnings of the Northern Pacific and the Great Northern for the ten years preceding 1908 might fairly be termed excessive and that reductions in revenues might therefore be made without violating the constitutional rights of those companies. Having determined that question, we did not make reductions in rates to Spokane for the reason that these revenues were excessive and for the purpose of reducing those revenues. Without attempting to say whether this commission might in any case reduce rates for the sole reason that revenues were found excessive, it has not attempted to do so in this case.

In some respects the Northern Pacific has cost more and in some respects less than a similar railway east of the Missouri river. The cost of operation is somewhat more, and in our opinion the corresponding freight rates may properly be somewhat higher in this territory than east of the Missouri river, but we were unable to see, when our first opinion in this case was promulgated, and we are unable to see now, any excuse for these abnormally high rates between St. Paul and Spokane. What is said of the Northern Pacific applies to the Union Pacific lines leading west from the Missouri river, and to the Great Northern, although the amount of business handled by the latter line is somewhat less than that of the other two.

We are of the opinion that the present rates charged by the Great Northern and the Northern Pacific on the commodities specified in the supplemental complaint from the defined territories mentioned in that complaint to Spokane are unreasonable, and that just and reasonable rates, which ought not to be exceeded for the future, would be those which are set forth in Schedule A.

In fixing these rates we have proceeded upon the view that, under the present decisions of the Supreme Court of the United

States, we could not use the rate to Seattle as a standard by which to measure that to Spokane. If this were otherwise, if we were free to take into account all the competitive conditions existing both east and west and to determine what, in the light of all these conditions, would be a just and reasonable relation between the rates of Seattle and Spokane, a somewhat different question would be presented.

The next question is, From what point or points in the east shall we establish rates to Spokane?

As a rule transcontinental commodity rates apply as blanket rates to Pacific coast terminals from all territory on the Missouri river and east, but to this there are some exceptions.

At the present time class rates to Spokane from territory east of Chicago are made by combination upon Chicago or St. Paul, the Official Classification governing up to Chicago or St. Paul and the Western Classification beyond.

We are of the opinion that joint through rates, both class and commodity, should be established from defined territories east of Chicago to Spokane. Schedule A defines certain territories as they are now to be found in the Spokane tariffs and names class rates governed by Western Classification and commodity rates from these territories to Spokane.

The lines east of Chicago parties to this proceeding are the Lake Shore & Michigan Southern, the Pittsburgh, Fort Wayne & Chicago, the Pennsylvania Railroad, the New York Central & Hudson River, the Boston & Maine, and the New York, New Haven & Hartford. Where joint through rates do not now exist from points upon these lines to Spokane, we find that there is no reasonable and satisfactory through route, and that such through route and joint rate ought to be established.

In the past, transcontinental and Spokane tariffs have both recognized a territorial division known as Mississippi river points and another division known as Chicago points. Commodity rates to Spokane have usually been the same from both these territorial divisions; rates upon the higher classes have usually been somewhat less from the Mississippi river. In disposing of the original case no inquiry was made as to whether the rates fixed for Chicago should apply at the Mississippi river. Examining this question now in this case and similar cases before us, it seems to us that both class and commodity rates should be slightly lower from Mississippi river points than from Chicago points.

In the original case, certain arbitraries were added to the St. Paul-Spokane rate in constructing the rate from Chicago. In further examining this question with a view to establishing class rates from eastern defined territories, we have reached the conclusion that the spread between the St. Paul and Chicago rates was somewhat too great, and class rates have been named in Schedule A which are slightly less than those formerly prescribed. The previous finding of the commission is amended accordingly.

With respect to commodity rates upon the few commodities dealt with in the original case, the opinion was expressed that the Chicago rate should exceed the St. Paul rate by about 16 per cent. On further reflection, we are of the opinion that this difference was somewhat too great. In the past no distinction has ordinarily been made by the carriers themselves between Chicago and the Missouri river in their commodity rates to Spokane, and the difference in the schedule proposed by the defendants did not ordinarily exceed 10 per cent.

The final question is, To what points shall the rates which we establish to Spokane be extended? Spokane was the only complaining territory in the original suit, but since our decision Baker City, La Grande and Pendleton, in the state of Oregon, and Walla Walla, in the state of Washington, have filed intervening petitions asking that rates not higher than those established at Spokane be fixed for these localities.

In the past Spokane rates from St. Paul have applied upon the Great Northern as far west as Avery, 111 miles from Spokane, and upon the Northern Pacific as far west as Kennewick, 149 miles. The Northern Pacific has a branch line to Pendleton and has maintained at Pendleton the Spokane rate from St. Paul. We are of the opinion that the rates which we have established to Spokane should be applied by the Great Northern and Northern Pacific to those points at which the Spokane rate has been maintained in the past.

We are of the opinion that the class and commodity rates specified in Schedule A would be just and reasonable rates to be applied by the Union Pacific lines and their eastern connec-

tions from the defined territories therein named to Baker City, La Grande and Pendleton in the state of Oregon, and Walla Walla in the state of Washington, and that the present rates maintained to those points, in so far as they exceed the rates specified in Schedule A, are unjust and unreasonable. We shall not require the maintenance of these rates via the Union Pacific lines at Spokane, but no opinion is at this time expressed as to territory between Walla Walla and Spokane.

We make the same findings with respect to the establishment of through routes and joint rates via the Union Pacific lines and their connections to these destinations which we have already made with respect to the Northern Pacific and the Great Northern to Spokane.

We realize that to establish the rates prescribed by Schedule A, together with those fixed by the commission in other cognate cases now pending before it, will require an extensive revision of the tariffs of the defendants and will entail a material reduction in their revenues. We have endeavored to approximately ascertain this amount and believe the reduction will not be undue. We desire, however, to proceed in this matter with great caution and have therefore determined before making a final order to learn the result of an actual test. Carriers will be required, for the months of July, August and September, 1910, or for such other representative months as may be determined upon by the commission after conference with the carriers, to furnish an accurate and detailed account showing the revenue which accrued upon business actually handled under present rates and the revenue which would have accrued upon the same business had the rates here prescribed been in effect.

This account should be confined to traffic covered by the rates named, but the carriers may, if they elect, indicate what other changes will be required which are not covered by the rates prescribed in this and other cases and may keep separate accounts, showing the loss as applied to actual transactions. (19 I. C. C., 182.)

#### Reductions to Salt Lake.

*Commercial Club, Traffic Bureau, of Salt Lake City, Utah, v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Prouty.*

The two lines mainly involved in this case are the Union Pacific and the Denver & Rio Grande, and these companies have assumed the burden of this defense. They both claim that the reductions asked for would so impair their revenues as to work, if not the absolute confiscation of their property, against which the constitution protects them, at least such an impairment of income as would deprive them of a just and reasonable return on the value of that property.

This statement treats the lines of the Union Pacific, the Oregon Short Line, and the Oregon Railroad & Navigation Co. as a single property. The road interested in these rates between eastern destinations and Utah points is the Union Pacific. The last statistical report of that company to this commission shows a main line mileage of 1,893 miles, with branches of 1,415 miles, a total of 3,308 miles. In round numbers its funded debt was \$226,000,000 and its capital stock \$299,000,000, a total of \$525,000,000, or \$159,000 per mile. In the year 1909 it earned net from operation after the payment of taxes about \$6,900 per mile. These earnings exceed any group in the United States except group 2, which they nearly equal.

The financial showing of the Denver & Rio Grande is nothing like as favorable as that of the Union Pacific. This company introduced and placed great stress on a statement showing its net income from operation for the year 1899 to 1909, inclusive, from which it appeared that for the years 1903, 1906 and 1909 there had been what was styled a "deficit," that for 1909 being much the largest and amounting to \$650,000. It was urged that to reduce these rates would further increase this so-called deficit.

The main line of the Denver & Rio Grande is 716 miles in length, and its branches, usually short, aggregate 1,813 miles. Its funded debt is now \$107,000,000, or \$42,479 per mile. Its capital stock is divided between common and preferred, \$38,000,000 of the former and \$46,000,000 of the latter, totaling \$33,127 per mile.

The Denver & Rio Grande is situated, for the most part, among the mountains. Its cost of construction was high, and the expense of operation is much greater than that of the Union Pacific. It is the claim of this company that we should determine the reasonableness of these rates with reference to the cost of handling the traffic by its line and with reference to its financial necessities and not with reference to the Union Pacific.

The Denver & Rio Grande was built for the purpose of handling the local business tributary to its line. No railway would ever have been built where this one is for the main purpose of handling through business like that under consideration. To-day its branch lines aggregate two and one-half times the mileage of its main line, over which this traffic passes. The great bulk of its tonnage to-day is from local business. Its line is longer than that of the Union Pacific between all points.

This commission has said that in determining a freight rate which must of necessity be charged by competing lines, it would not look exclusively to that line which could handle the business the cheapest or which was the strongest financially, but would consider as well the weaker rival; yet it has never intimated that the rate should be fixed solely with reference to the weakest line, and it would certainly be most unjust to the public, in establishing these rates, to consider merely the expensive and circuitous route.

Present class rates in both directions between Chicago, the Mississippi river and the Missouri river, on the one hand, and Utah common points, on the other, are found unreasonable. Present westbound commodity rates from the above-named eastern points of origin to Utah common points are found unreasonable, and present eastbound rates on certain products of Utah to the Missouri river, the Mississippi river, and Chicago are found unreasonable.

Present rates on deciduous and citrus fruits from points of production in California to Utah common points are also found unreasonable, and defendants should establish to Utah points proportional import rates on certain named articles which do not exceed those contemporaneously in force to the Missouri river, and the present rates upon sago, tapioca, tea and tea dust are found unreasonable to the extent that they exceed those now in effect to Missouri river points.

Present passenger fares between Utah common points, on the one hand, and between Ogden, Omaha and Portland, on the other, are not found unreasonable; but present fares between Salt Lake City and Los Angeles, Salt Lake City and San Francisco, and between Ogden and Provo and San Francisco are found unreasonable.

The complaint alleges that defendants pool traffic from the east to Utah points; but the record contains no proof of this allegation, and the point was not pressed on the argument.

An order will be issued in accordance with the opinion herein, except in case of class and commodity rates between eastern defined territories and Utah points, as to which no order at present will be made; but defendants will be required to keep account for three months, showing the difference between their receipts on traffic actually moved under present rates and what those receipts would have been had these proposed rates been in effect. (19 I. C. C., 218.)

#### Reduction in Eastbound Rates.

*Traffic Bureau of the Merchants' Exchange v. Southern Pacific. Opinion by Commissioner Lane.*

Class rates from Sacramento, Cal., to points on the main line of the Southern Pacific between Reno, Nev., and Cecil Junction, Utah, inclusive, found excessive; reasonable rates prescribed for the future. (19 I. C. C., 259.)

*Portland Chamber of Commerce v. Oregon Railroad & Navigation et al. Transportation Bureau of Seattle Chamber of Commerce et al. v. Northern Pacific et al. Opinion by Chairman Knapp.*

The defendants' interstate class rates from Seattle, Wash., Tacoma and Portland, Oregon, to points in Washington, Oregon, Idaho and Montana are found by the commission to be unreasonable and reduction of 20 per cent. in said rates proposed. (19 I. C. C., 265.)



MONTH OF MAY, 1910.

\*Mileage operated on May 31, 1909, 1,896 miles. †Began operations on September 1, 1909, succeeding Chicago Great Western Ry.; Mason City & Fort Dodge R.R.; Wisconsin, Minnesota & Pacific Ry. ‡Mileage operated on May 31, 1909, 893 miles. §Mileage operated on May 31, 1909, 867 miles. ||Mileage operated on May 31, 1909, 1,901 miles. ¶Mileage operated on May 31, 1909, 9,960 miles. ⓂMileage operated on May 1, 1910, succeeding Norfolk & Southern Ry. ⓃMileage operated on May 31, 1909, 1,980 miles. ΔMileage operated on May 31, 1909, 5,695 miles. — In-creases Deficits, Losses and Decreases.

## Nevada Rate Reductions.

*Railroad Commission of Nevada v. Southern Pacific et al. Opinion by Commissioner Lane.*

The highest main-line rates to be found in the United States are those from eastern points to stations in Nevada. For carrying a carload of first class traffic containing 20,000 lbs. from Omaha to Reno the Union Pacific-Southern Pacific line charges \$858. If a like carload is carried 154 miles further, to Sacramento, the charge is but \$600. The first class rate to the more distant point, Sacramento, is \$3 per 100 lbs. and to the nearer point, Reno, \$4.29 per 100 lbs. If a like carload of freight originates at Denver, 500 miles west of Omaha, the same rates to Reno and Sacramento apply; and if the freight originates at Boston, 1,700 miles east of Omaha, the rates are the same. This interesting rate condition arises out of two simple facts: (1) The whole of the United States from Colorado common points to the Atlantic seaboard, barring a few of the southeastern states, is one wide group or zone from which practically uniform rates to Pacific coast water points are made, and (2) the rates to Reno are based upon these blanket rates to coast cities, and amount to the sum of the rates to the coast plus the local rates back to point of destination.

This great zone, extending from the Rocky Mountains to the Atlantic, a distance of over 2,000 miles, from which practically uniform rates are made to Pacific coast terminal cities, is probably without parallel in the railway world, excepting for a similar eastward blanket extended to Pacific coast producing points. The zone in which the same rates apply on California citrus fruits, for instance, extends from Salt Lake City on the west to Portland, Me. It is manifest that the transcontinental railways have made a near approximation to the postage-stamp system of rate making. Their policy has been to give to all eastern producing markets an opportunity to sell to the terminal cities on a parity as to transportation charges and to give to Pacific coast producing points access to all eastern markets upon a like basis. To the great basin lying between the Rocky Mountains and the Sierra Nevadas the carriers have in a limited degree extended this same policy by making rates into Nevada base on the coast cities, and thus, the carriers say, they give to this territory the advantage of its proximity to the Pacific seaboard; that the rates to the latter are made low because of water competition between the Atlantic and Pacific ports—lower than would be justified were Sacramento and San Francisco not on the water—and that Nevada rates would be still higher but for its nearness to the Pacific coast.

The time has come, in our opinion, when the carriers west of the Rocky Mountains must treat the intermountain country on a different basis from that which has hitherto obtained. Nevada asks that she be given rates as low as those given to Sacramento. The full extent of this petition cannot be granted. In making rates to Reno from a territory broader than the whole of continental Europe we have necessarily given consideration to existing rates to other intermediate points and to points upon the Pacific. We are of opinion that the class rates to Reno, Winnemucca and Elko, and other points in Nevada upon the main line of the Southern Pacific, from stations on the lines of the defendants between New York and Denver and other Colorado common points are unreasonable and reductions are ordered.

We are of the opinion that justice cannot be done to Nevada unless Nevada points are put on a practical parity with points in eastern Washington and eastern Oregon, and a further hearing will, in due course, be held after the data here requested have been furnished by carriers and complainant. (19 I. C. C., 238.)

## Rates to Arizona Reduced.

*Maricopa County Commercial Club v. Santa Fe, Prescott & Phoenix et al. Opinion by Commissioner Lane.*

Class rates from points within eastern territory between the Missouri river and the Pittsburgh-Buffalo line to Phoenix, Ariz., found unreasonable. The commission reasoning in this case followed that in the Spokane, Salt Lake and Nevada cases. The commission therefore prescribed reasonable rates for the future, to remain in effect for the usual two years. (19 I. C. C., 257.)

## STATE COMMISSIONS.

Dr. F. M. Sheppard has been appointed a member of the Railroad Commission of Mississippi, succeeding President Lee, deceased.

At Indianapolis this week, on invitation of the Indiana State Railroad Commission, there is being held a conference of commissioners of Indiana, Ohio, Illinois and Michigan to discuss the general movement for increases in freight rates which has been begun by the railways.

The New York Public Service Commission, Second district, has found that the complaints from commuters in Westchester county against the raising of commutation rates to New York City by the New York Central & Hudson River cannot be upheld. The commission finds that the higher rates were properly filed and published.

The New York Public Service Commission, Second district, completed three years of its existence on June 30. During that time there were submitted to the commission 4,918 applications, complaints, etc. During the first three years of the Board of Railroad Commissioners that body had presented to it 219 matters, and during the entire 24 years and three months of its existence the number was 4,814.

## COURT NEWS.

In the United States Circuit Court at San Francisco, July 1, the Southern Pacific Company, pleading guilty, was fined \$18,000 on 18 counts of an indictment for payment of illegal rebates on shipments of matting from Japan to points in this country, and on shipments of lumber from Verdi, Nevada.

The Supreme Court of the United States, in the case of King vs. the Southern Railway Company, has affirmed the judgment against the railway company for damages on account of the death of a man who was killed at a highway crossing, where the law required every engineman to check his speed from the whistling post to the crossing. The decision, however, does not touch the merits of this absurd law, the court basing its opinion on the technical ground that the railway had not presented facts to show that the operation of the statute did really affect interstate commerce to such an extent as to make it an unlawful regulation of such commerce.

## Private Railways of Australia.

On June 30, 1909, there were 943 miles of private railways open for general traffic; of this mileage 141 were in New South Wales, 14 in Victoria, 346 in Queensland, 277 in Western Australia and 165 in Tasmania. The capital cost of the lines, excepting that of Hexham-Minmi, 6 miles, in New South Wales, and the Midland, 277 miles in Western Australia, was \$15,525,960. The gross revenue during the year 1908 was \$2,804,535 and the working expenses \$1,088,165. During the year 924,000 passengers and 1,627,000 tons of freight were carried, the train mileage being 1,389,883. The employees numbered 1,263 and the rolling stock consisted of 94 locomotives, 109 passenger cars and 1,617 freight cars.

In addition to the foregoing, there were, on June 30, 1909, 637 miles of private railways open for special purposes, Western Australia heading the list with 361½ miles, New South Wales being second with 124¼ miles; South Australia, 58 miles; Tasmania, 38¾ miles; Victoria, 32¾ miles, and Queensland, 21¾ miles. The Government railways open for traffic on that date in the Commonwealth had a length of 15,072¼ miles, giving a total of 16,652¼ miles.

Classified according to gage, there were 4,016 miles built to the 5 ft. 3 in., viz.: New South Wales, 45 miles; Victoria, 3,371¾ miles, and South Australia, 599¼ miles. The 4 ft. 8½ in. gage was adopted in New South Wales only, the mileage being 3,804. The 3 ft. 6 in. gage shows the greatest length, viz., 8,622¾ miles, of which 39¾ miles were in New South Wales, four miles in Victoria, 3,784¾ miles in Queensland, 1,492¼ in South Australia, 2,683 miles in Western Australia and 619¼ miles in Tasmania. Victoria possesses 81 miles of line built to the 2 ft. 6 in. gage, Queensland 81 miles of 2-ft. gage and Tasmania 47½ miles.



## Railway Officers.

### ELECTIONS AND APPOINTMENTS.

#### Executive, Financial and Legal Officers.

A. B. Cauthen, assistant auditor of the Durham & Southern, at Durham, N. C., has been appointed auditor, in charge of the accounting department.

Meade T. Spicer, chief clerk to G. W. Stevens, president of the Chesapeake & Ohio, has been appointed also an assistant secretary of the C. & O.

George C. Taylor, manager of the Pacific division of the American Express Company, has been appointed vice-president and general manager, with office in Chicago.

A. C. Hamilton has been appointed vice-president and general counsel of the Texas Mexican railway and general counsel for the National Railways of Mexico, with office at Laredo, Tex.

F. W. Schwarz, secretary of the Monongahela Railroad at Philadelphia, Pa., having reached the age limit, has been retired. Mr. Schwarz has been continuously in the service of the Pennsylvania lines since 1869.

Carroll M. Bunting, whose appointment as comptroller of the Pennsylvania Railroad has been announced in these columns, was born September 15, 1871, at Darby, Pa. He graduated from the Darby Friends School, Philadelphia public school and Bryant & Stratton Business College. Mr. Bunting began railway work in 1887 as bill of lading clerk and stenographer in the office of the freight agent at Philadelphia, of the Chicago, Rock Island & Pacific. He later entered the office of the through freight agent of the Northern Pacific and Wisconsin Central railway companies. On May 19, 1890, he entered the service of the Pennsylvania Railroad as secretary to Captain John P. Green, then third vice-president of the company. Mr. Bunting was made chief clerk to the first vice-president May 1, 1897, assistant to the first vice-president on June 1, 1906, and assistant comptroller March 29, 1909, which position he held at the time of his recent appointment as comptroller.

The officers of the Chesapeake & Ohio Railroad of Indiana, which has been formed to take over the Chicago, Cincinnati & Louisville, are as follows: Frank M. Whitaker, president, Cincinnati, Ohio; Henry C. Starr, vice-president, Chicago, and James Steuart MacKie, secretary, New York. Mr. Whitaker is vice-president and traffic manager, Mr. MacKie secretary and treasurer of the Chesapeake & Ohio, and Mr. Starr is vice-president and general counsel of the Chicago, Cincinnati & Louisville.

Garrett B. Wall, whose appointment as assistant to the president of the Chesapeake & Ohio, with office at Richmond, Va., has been announced in these columns, was born April 6, 1870, at Covington, Ky. Mr. Wall was educated at Washington & Lee University, and at the United States Naval Academy at Annapolis, Md. He began railway work as a clerk in the office of the general manager of the Chesapeake & Ohio in 1889, and was later chief clerk to the assistant superintendent, then to the superintendent, and later chief clerk to general superintendent. Mr. Wall was appointed real estate agent, July 1, 1898, and in addition to the duties of that office he will here-

after perform such other duties as may be assigned to him by the president.

W. N. D. Winne, general auditor of the Chicago, Milwaukee & St. Paul, the Chicago, Milwaukee & Puget Sound and the Tacoma Eastern, has been appointed comptroller of these companies, succeeding H. G. Haugan, whose resignation has been announced in these columns. The office of general auditor is abolished. J. W. Taylor has been appointed assistant to the comptroller of all these companies, and W. F. Dudley and B. A. Dousman have been appointed assistant general auditors of the Chicago, Milwaukee & St. Paul.

#### Operating Officers.

James W. Roberts, assistant chief clerk to the general manager of the Vandalia, has been appointed assistant car accountant.

E. Thomason, assistant to vice-president and auditor of the Durham & Southern at Durham, N. C., has been appointed general manager in charge of operation.

Robert W. Baxter has been appointed general superintendent of the Illinois Central and the Indianapolis Southern, with office at Chicago, succeeding Charles L. Ewing, resigned.

R. B. Williams having resigned as general superintendent of the Gulf, Texas & Western, the position has been abolished. F. M. Bowman, assistant to the vice-president and general manager, with office at Dallas, Tex., has assumed the duties of the general superintendent.

Chas. T. Brimson, engineer maintenance of way of the Quincy, Omaha & Kansas City, and the Iowa & St. Louis, has been appointed superintendent and engineer with office at Kansas City, Mo., assuming in addition to his former duties those of W. J. Stone Burner, superintendent, whose resignation has been announced in these columns.

W. S. Wilson has been appointed trainmaster of the Twenty-second and Twenty-third districts of the Grand Trunk, with office at Stratford, Ont., and C. Forrester has been appointed trainmaster of the Fifteenth, Twenty-first and Twentieth (Buffalo and Goderich districts), with office at Stratford, succeeding J. A. McLardy, resigned to go into other business.

Charles Ware, general superintendent; C. E. Fuller, superintendent of motive power and machinery; R. L. Huntley, chief engineer; W. D. Lincoln, superintendent of transportation, and T. M. Orr, assistant to the general manager, have been appointed assistant general managers of the Union Pacific under the Hine system of operation. (See article elsewhere in this issue.)

Homer Leslie Hungerford, whose appointment as superintendent of the Southern Railway, with office at Greenville, S. C., has been announced in these columns, was born on November 16, 1867, at Dowagiac, Mich. He was educated in the high schools and began railway work as a telegraph operator on the Michigan Central in October, 1883, remaining with that company for over six years. He then went to the East Tennessee, Virginia & Georgia, now a part of the Southern Railway, as despatcher, at Selma, Ala. In September, 1892, he was appointed chief despatcher of the Mobile & Birmingham, at Mobile. In May of the following year he was made trainmaster and was general superintendent for a short time in 1899, when the Southern Railway secured control of the Mobile & Birmingham. From June, 1899, to January, 1906, he was trainmaster on the Mobile & Ohio at Meridian, Jackson and Mobile. In January, 1906, he went to the St. Louis, Iron Mountain & Southern as superintendent of terminals at Little Rock, Ark., and the following July was made superintendent of the Memphis division of that road. In February, 1907, he was appointed superintendent of the Southern Railway at Charleston, S. C., which position he held at the time of his recent appointment as superintendent of the Charlotte division at Greenville.

John G. Walber, whose appointment as assistant general manager of the Baltimore & Ohio, with headquarters at Baltimore, Md., has been announced in these columns, began railway work on the Ohio & Mississippi in the office of the president and general manager in February, 1885, and became secretary to that official in 1887. On the consolidation of the Ohio & Mis-



C. M. Bunting.

Mississippi and the Baltimore & Ohio Southwestern in November, 1893, Mr. Walber became secretary to the second vice-president and traffic manager at St. Louis, Mo. He remained in that position until March, 1896, returning to Cincinnati as secretary to George F. Randolph, general traffic manager of the B. & O. S. W., and one month later he became secretary to the vice-president and general manager. In December, 1898, he was made chief clerk to the same officer, and in November, 1902, he was elected also assistant secretary of the Baltimore & Ohio Southwestern. In addition to his duties as assistant secretary he also had charge of the tax and insurance departments. In February, 1904, Mr. Walber was promoted to assistant to the general manager, and two years later he was made assistant general manager. Mr. Walber was transferred to Baltimore as assistant to the third vice-president of the Baltimore & Ohio, January 20, 1908. He was promoted to general superintendent of transportation of the Baltimore & Ohio and Baltimore & Ohio Southwestern lines January 1, 1909.

#### Traffic Officers.

F. L. Feakins has been appointed general agent of the Denver & Rio Grande at Omaha, Neb.

The title of J. H. Grace, general agent of the Great Northern at Chicago, has been changed to assistant general freight agent.

Edward T. Wood has been appointed division freight agent of the Pennsylvania Co., in charge of a new office at Fort Wayne, Ind.

E. H. Fell has been appointed assistant general passenger agent of the Atlanta, Birmingham & Atlantic, with office at Atlanta, Ga.

C. P. Peterson, traveling freight agent of the Chicago, Milwaukee & St. Paul, has been appointed commercial agent at Davenport, Iowa.

Douglas White has been appointed industrial agent of the San Pedro, Los Angeles & Salt Lake, with headquarters at Los Angeles, Cal.

John A. Wesson has been appointed a soliciting agent of the Central of Georgia, with office at Albany, Ga., succeeding R. G. Parish, resigned.

John T. Bowe has been appointed general agent of the Denver & Rio Grande, with headquarters in Chicago, succeeding R. C. Nichol, transferred.

Alfred W. Obergfell has been appointed westbound freight solicitor of the Union Line at Milwaukee, Wis., succeeding L. E. Clemenson, deceased.

J. H. Davis has been appointed traveling freight and passenger agent of the Colorado Midland at Salt Lake City, Utah, succeeding L. H. Harding, resigned.

C. A. Rouse has been appointed a commercial agent of the Erie Despatch, with office at Indianapolis, Ind., succeeding W. H. Tennis, assigned to special duties.

R. C. Nichol, general agent of the Denver & Rio Grande at Chicago, has been appointed general agent of the Denver & Rio Grande and the Western Pacific, with office at New York.

J. C. Moffatt, division freight agent of the Erie Railroad at New York, has been transferred to Bradford, Pa., succeeding E. U. Baker, transferred. G. R. Wheeler succeeds Mr. Moffatt.

W. T. Dunne, contracting freight agent of the Chicago, Peoria & St. Louis, with headquarters at Chicago, has been appointed traveling freight agent in Wisconsin. W. S. Talmage succeeds Mr. Dunne.

D. Lumpkin, acting general freight and passenger agent of the Durham & Southern, at Durham, N. C., has been appointed general freight and passenger agent in charge of traffic, freight and passenger claims.

W. H. Timberlake, traveling freight agent of the Queen & Crescent, at Shreveport, La., has been appointed a commercial agent, with office at Dallas, Tex., succeeding Charles H. Gomm, resigned to go to another company.

H. C. Piculell, commercial freight agent of the Baltimore & Ohio at Omaha, Neb., has been appointed Pacific coast agent of

the freight and passenger departments, with headquarters at San Francisco, Cal., succeeding E. Anderson, deceased. L. G. Reynolds succeeds Mr. Piculell.

C. W. Fish, general freight agent of the National Railways of Mexico and the Inter-oceanic Railway of Mexico, at Mexico City, Mexico, has been appointed traffic manager of both these companies, in charge of all matters pertaining to the freight, passenger and customs agency departments.

W. A. Beckler, assistant general passenger agent of the Queen & Crescent, with office at Cincinnati, Ohio, has been appointed general passenger agent, succeeding W. C. Rinearson, deceased. J. C. Conn, district passenger agent at Chattanooga, Tenn., succeeds Mr. Beckler, his headquarters remaining at Chattanooga.

E. A. Watson, New England passenger agent of the West Shore Railroad, has resigned to go into other business and the position has been abolished. The authority of A. S. Hanson, general agent at Boston, Mass., has been extended to cover the passenger business of the West Shore in the New England territory.

Gerrit Fort, general passenger agent of the New York Central & Hudson River, with office at New York, has been appointed passenger traffic manager of the Union Pacific, succeeding to the duties of E. L. Lomax, general passenger agent, whose resignation has been announced in these columns. A portrait and sketch of Mr. Fort's railway life was published in the *Railway Age Gazette* February 14, 1910, page 377.

F. Strayer has been appointed traveling freight agent of the Chicago, Indianapolis & Louisville, with headquarters at Lafayette, Ind. The following changes in title have been announced: H. L. Moore, agent at Minneapolis, Minn., commercial agent; R. R. Hargis, general agent at Atlanta, Ga., commercial agent; D. A. Denmark, general agent at Valdosta, Ga., commercial agent; A. J. O'Reilly, general agent at Indianapolis, Ind., commercial agent.

#### Engineering and Rolling Stock Officers.

C. W. Power has been appointed resident engineer of the Grand Trunk, with office at Toronto, Ont., succeeding E. L. Cousins, resigned to go to another company.

G. E. Tebbetts, assistant bridge engineer of the Chicago, Burlington & Quincy, has been appointed bridge engineer of the Kansas City Terminal Ry. G. A. Haggender succeeds Mr. Tebbetts.

R. E. Gaut, engineer bridges and buildings of the Illinois Central, has resigned to accept a position with the Leonard Construction Co., Chicago. F. L. Thompson, assistant engineer of bridges, succeeds Mr. Gaut.

T. H. Goodnow has resumed the office of master car builder of the Chicago, Indiana & Southern and the Indiana Harbor Belt, with office at Englewood, Ill., succeeding J. W. Senger, appointed June 1, and who is now transferred.

#### Purchasing Officers.

Don B. Sebastian, acting fuel agent of the Rock Island Lines, has been appointed fuel agent with office in Chicago.

T. J. Powell has been appointed purchasing agent of the Frisco lines, with office in St. Louis, Mo., succeeding M. E. Towner, resigned.

#### Railway Developments in Sicily.

The most important projects at present are those made necessary by the great earthquake. Among these are the building of large freight stations at Messina and at Catania Acquicella, plans for which are well under way. The branch lines Castelvetro-Selinunte, Castelvetro-Partanna (in the province of Trapani) and Naro-Canicatti, in the province of Girgenti, are practically completed. The Castelvetro-Selinunte line will ultimately be continued to Sciacca and Porto Empedocle. The motor-bus service in Sicily is developing, although not so much as the inadequacy of railway communications would have led one to expect, and in some places the preference for more antiquated means of conveyance has discouraged projected ventures.



## Railway Construction.

### New Incorporations, Surveys, Etc.

**AMERICAN FALLS, ROCKLAND & SOUTHEASTERN.**—This company has been incorporated in Idaho to build from American Falls, Idaho, south to Rockland, 30 miles. D. W. Davies, American Falls, is the principal promoter.

**BIG BLACK FOOT RAILWAY.**—Grading contracts are let to Clifton & Applegate to build from Bonner, Mont., to Mile 20, and to White Brothers, Missoula, from Mile 20 to Mile 55. The company's plans call for a line from Bonner northeast via Clearwater to Ovando. There will be two steel bridges. John R. Toole, president, Bonner.

**BLACK BAYOU.**—An officer writes that the plans call for a line from Myrtistown, La., southwesterly for 22 miles. Track has been laid on six miles, and plans are made to extend the line during the next seven months. W. H. Welch, of the Southern Lumber Co., Myrtistown, is president, and T. D. Singleton, chief engineer, Texarkana, Ark.

**CANADIAN NORTHERN.**—A contract is said to have been given to the Northern Company for building a section of 60 miles through British Columbia from New Westminster to Chilliwack, the work to be started at once and finished this summer. Contracts for additional sections of the 600 miles to be built through British Columbia are to be let as soon as plans and specifications are prepared. It is expected that the entire work will be finished within four years.

**CANADIAN NORTHERN ONTARIO.**—An officer writes that grading has just been started on the line from Hawkesbury, Ont., east to Montreal, Que. J. P. Mullarkey, Montreal, is the contractor.

**CANADIAN PACIFIC.**—An officer writes that a contract has been let to Foley, Welch & Stewart for grading work on the Kootenay Central, from a point near Wardner, B. C., northerly towards Fort Steel, 25 miles. (June 24, p. 1812.)

**CHICAGO & WISCONSIN VALLEY.**—Work is to be started at once, it is said, between Portage, Wis., and Janesville. Surveys have been made. The directors include: A. J. Behymer, J. W. Purves and T. W. Potts. (June 24, p. 1812.)

**CHICAGO, MILWAUKEE & ST. PAUL.**—An officer writes that this company has bought about 800 acres of land for an outside yard near Franklin Park, Ill. The present intention is to construct a receiving yard, of eight tracks, with capacity of 680 cars; also a modern "hump," or classification yard, of 17 tracks, with capacity of 924 cars; a departure yard of 17 tracks, to hold 916 cars, and a grain yard of 10 tracks, for 580 cars. This will represent about one-half the development of the receiving yard. Eventually there will be an outbound yard, about equal in capacity to the yard herein described, when all the traffic in and outbound will be handled in one yard. The receiving yard will be 5,000 ft. long, and the classification, departure and grain yard will extend 9,300 ft. further. About 200 acres will be utilized at present, leaving 600 acres for future development. The purpose of this yard is to receive road and transfer trains from all divisions, and relieve the Galewood and Western avenue yards. The approximate cost of the land is \$375,000, and the present improvements will cost about \$592,000. The only building in the new yard will be the yardmaster's office, as the principal locomotive and repair plant will remain at Galewood. None of this work will be done by contract.

**CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.**—Progress is being made on the improvement and double-tracking work between Anderson, Ind., and Indianapolis. The company plans to have the work finished by November 1. A force of 400 men are at work on the bridges and culverts. Costello Brothers, St. Louis, Mo., the general contractors, have sublet some of the work to Grant Brothers, Champaign, Ill. (May 27, p. 1324.)

**COLORADO & SOUTHERN.**—An officer writes that a contract for grading and bridging work has been let to the Utah Construction Co., Salt Lake City, Utah, for double-tracking the line from Minnequa, Colo., to Walsenburg, 46.6 miles. This involves the excavation of 1,250,000 cu. yds. of earth, 370,000 cu. yds. of loose rock, 500,000 cu. yds. of solid rock, also 3,100,000 cu. yds. of borrow, 5,000,000 cu. yds. of overhaul and 50,000 cu. yds. of concrete for bridges and culverts. Maximum grades northbound

0.2 per cent., southbound 1 per cent. Maximum curvature 2 degs. Total curvature 904 degs., 12 min.; tangent 33.87 miles, equal to 72.7 per cent. Total length of bridges 360 ft. The rails will be 85-lb. or 90-lb., and the total estimated cost of the work is \$4,000,000. This improvement is being carried out jointly by the Denver & Rio Grande and the Colorado Railroad Co., a subsidiary of the Colorado & Southern. It is expected that the work will be finished by October, 1911. The construction work is heavy but not particularly difficult. There will be several concrete culverts and bridges, also several steel bridges. (March 4, p. 460.)

**COLORADO RAILROAD.**—See Colorado & Southern.

**CROSBYTON-SOUTH PLAINS.**—Contracts are to be let in July, it is said, for building from Crosbyton, Tex., west to Lubbock, 40 miles. P. L. Coonley, president, Thirty-ninth street and Stewart avenue, Chicago.

**CRYSTAL CITY & GARDENDALE.**—See Crystal City & Uvalde.

**CRYSTAL CITY & UVALDE.**—An officer writes that contracts have been let for building the Crystal City & Gardendale, from Crystal City, Tex., east to Gardendale, 41 miles. The work includes two steel bridges. A. R. Ponder, president, and E. Breaker, chief engineer, Crystal City. (June 17, p. 1567.)

**DENVER & RIO GRANDE.**—See Colorado & Southern.

**FRANKLIN & ABBEVILLE.**—According to press reports, work has been finished on the extension from David junction, in Iberia parish, La., northwest to Milton, 17 miles. (March 25, p. 850.)

**HIGHLAND PACIFIC.**—Surveys have been made and contracts will be let soon, it is said, to build from Santa Rosa, Cal., north via Highland Springs and Lakeport, to Upper Lake, about 60 miles. Dr. A. E. Dickinson, president, Ukiah.

**IBERIA, ST. MARY & EASTERN.**—An officer writes that the prospects of building this line are good. The plans call for a line from New Iberia, La., southeast via Jeanerette, Charenton, Franklin and Patterson to Morgan City, 52 miles. The work will be light. There will be two steel bridges, each to have a 150-ft. draw span. The company expects to secure its principal revenue from hauling sugar cane and products. F. M. Welch, president; H. A. Genung, chief engineer, New Iberia.

**KOOTENAY CENTRAL.**—See Canadian Pacific.

**MILWAUKEE WESTERN ELECTRIC.**—An officer writes that this company was organized in Wisconsin, with \$200,000 capital, to build 100 miles of electric lines. Surveys have been made from Milwaukee, Wis., northwest via Sussex, North Lake, Neosho and Beaver Dam to Foxlake, with a branch from Sussex, south to Waukesha. An extension is eventually to be built north via Markesan to Green Lake after the line is in operation to Foxlake. The company is planning to begin work, and will probably let contracts this fall. Maximum grade will be 1.3 per cent. There will be about three steel bridges. The general contract has been given to W. D. Chapman, Marquette building, Chicago. V. Zimmerman, Jr., president, and C. A. Chapman, Inc., are the engineers, Chicago.

**MONTANA, IDAHO & PACIFIC.**—This company has filed plats of the survey from Lapwai Junction, Idaho, east to the clearwater section of Idaho and the Lolo pass. The line is eventually to be extended further east to Butte, Mont. J. H. Richards, president, Boise, Idaho, and G. W. Boschke, chief engineer, Portland, Ore.

**MOTOR GRAND TRACTION.**—Surveys are said to be made on 65 miles, and contracts are to be let soon, for building from Chester, Neb., south via Concordia, Kan., Salina and Newton to Wichita, 165 miles. E. S. Alnutt, president, Canton, Kan., and J. E. Daugherty, chief engineer, Wichita.

**NAPLES & NORTHWESTERN.**—An officer of the K. & P. Lumber Co., Cincinnati, Ohio, writes that the N. & N. W. is a logging line and work is now under way building an extension from Naples, Tex., to points in Oklahoma, about 20 miles. An extension is also to be built southeast to Shreveport, La. Max Kosse, president, Cincinnati, and A. E. Hinman, chief engineer, Naples.

**NORTHERN TEXAS TRACTION.**—Work is now under way by the Stone & Webster Engineering Corporation, Boston, Mass., building 14 miles of electric line in Texas. The company now operates an interurban line from Fort Worth, Tex., east to Dallas, 30 miles, and 10 miles of city line in Dallas.

**OREGON SHORT LINE.**—According to press reports, this company will build a cut-off between Logan, Utah, and Cache Junction. The proposed line is to be built through Benson and will be four or five miles shorter than the present route via Mendon.

**PECOS VALLEY SOUTHERN.**—An officer writes that a grading contract has been let to T. H. Brigance, Pecos, Tex., for building 45 miles. The plans call for a line from Pecos south via Saragosa and Balmorhea to the San Salmon. Track has been laid on 25 miles. Maximum grades will be 0.75 per cent. and maximum curvature 2 degs. There will be one steel bridge over the Toyah creek and two long trestles. W. L. Carwile, president, and L. W. Anderson, chief engineer, Pecos.

**PENNSYLVANIA RAILROAD.**—To eliminate congestion on its tracks between Broad street station and West Philadelphia, the Pennsylvania Railroad is enlarging its elevated line between these two points and building a passenger car storage yard east of the Schuylkill river. The present car yard is a mile away from Broad street station. The new car yard between Twentieth and Twenty-third streets will accommodate 60 cars, or about nine suburban trains, and will contain a 70-ft. turntable. The company bought 105 brick buildings, which will be demolished to make room for this yard. The work includes building retaining walls and embankments and the extension of the arch bridges over Twenty-first and Twenty-second streets; also the construction of two new bridges across the Schuylkill river. This will give room for four main line tracks between West Philadelphia station and the Twenty-third street interlocking plant. At the present time there are only two main line tracks crossing the Schuylkill river to West Philadelphia station. An inbound engine and empty car track is to be laid from West Philadelphia yard to the inbound Philadelphia, Baltimore & Washington track. Connection will also be made with the lower end of the passenger equipment yard in West Philadelphia. It is expected that all the work will be completed by December 1, at a cost of about \$750,000.

**SEATTLE-EVERETT TRACTION.**—Work is now under way by the Stone & Webster Engineering Corporation, Boston, Mass., building 26 miles of railway in the state of Washington. The company was organized to build a line to connect Seattle, Ballard, Edmonds and Everett. About 17.5 miles are now in operation.

**SOUTHERN PACIFIC.**—The San Joaquin division has been extended from Haiwee, Cal., to Olancho, nine miles (Feb. 11, p. 329).

This company has under consideration the question of extending its Llano, Texas, branch west to a connection with the Fort Worth & Rio Grande division of the Frisco, which is now being extended southwest from Brady to Menardville. The extension of the Southern Pacific will be about 75 miles, and it may eventually be extended to a connection with the Southern Pacific at Sanderson, Tex., 250 miles. The prospects are favorable for the development of the iron ore field near Llano, and the Southern Pacific is said to be making preparations to haul large quantities of ore from the Llano district to Galveston for shipment to eastern works.

**SOUTHERN PACIFIC OF MEXICO.**—The Sinaloa division has been extended from Escuinapa, Mex., southward to Yago, 93 miles. A new branch on the Sinaloa division has been opened for business from Quila Junction to El Dorado, 13 miles.

It is said that the engineers report that the proposed line between Tepic, Sinaloa, Mex., and Orendain, across the Sierra Madre, would be very costly to build, on account of the great barrancas that must be crossed, also the many mountains that must be tunneled. A new route may be selected. The company has under consideration the question of building directly south from Tepic, following the Pacific coast to a connection with the Manzanillo-Guadalajara line of the National Railways of Mexico at Manzanillo.

This company is said to have under consideration the ques-

tion of building a branch from a point on the Yaqui river line east to Chihuahua, in the State of the same name. A preliminary survey has been made. (April 1, p. 919.)

**TEXAS ROADS.**—Reports made to the Railroad Commission of Texas show that 735 miles were built in that state during the fiscal year ended June 30, 1910. Additional reports yet to be filed, it is understood, will bring the total up to about 800 miles. On June 30, 1909, the railway mileage, exclusive of sidings and yard tracks, was 13,110 miles. In addition, there are about 1,500 miles of logging railway not included in these figures. The sidings and yard tracks aggregate 3,500 miles. The following companies added new mileage during the fiscal year just closed as follows:

	Miles.
Asherton & Gulf Railroad, from Light to Asherton.....	20
Estacado & Gulf, from McCauley to Norman.....	6
Abilene & Southern, from Ovala to Ballinger.....	31
Pecos Valley Southern, from Pecos to Balmorhea.....	36
Bartlett & Florence, from Bartlett to Jarrell.....	11
Concho, San Saba & Llano Valley, from Miles to Paint Rock.....	17
Artesian Belt, from Macdonough to Christine.....	39
Gulf, Texas & Western, from Jacksboro to Seymour.....	75
Crystal City & Uvalde, from Uvalde to Carrizo Springs.....	33
Quanah, Acme & Paducah, from Quanah to Paducah.....	42
Roscoe, Snyder & Pacific, from Snyder to Fluvanna.....	19
Oklahoma, Red River & Texas, from Blossom to Deport.....	11
St. Louis, Brownsville & Mexico, branch from Madeline to Port O'Connor, 39 miles; branch from Buckeye to Collegeport, 16 miles; total.....	55
Stamford & Northwestern, from Stamford to Spur.....	82
Texas & Gulf, from Gary to Center.....	22
Kansas City, Mexico & Orient, from Sweetwater to San Angelo.....	74
Marshall & East Texas, from Marshall to Elysian Fields.....	16
Timpson & Henderson, from Ragley to Henderson.....	25
Pecos & North Texas, from Plainview to Lubbock, 46 miles; Plainview to Floydada, 26 miles; total.....	72
Chicago, Rock Island & Gulf, from Ortario to Findlay.....	35

It is officially announced that grading work is in progress on new lines and extensions of existing roads covering more than 1,200 miles, a large part of which will be finished during the present fiscal year. These include the Santa Fe cut-off that is being built between Coleman and Texico, 310 miles; the Kansas City, Mexico & Orient branch line from San Angelo to Del Rio, 150 miles, and main line extension from San Angelo to Alpine, about 225 miles; the San Antonio, Rio Grande & Tampico, from San Antonio to the Rio Grande border crossing, 260 miles, and the Frisco branch line from Brady to Menardville, 36 miles.

Bids are wanted until Aug. 8 by the United States Reclamation Service, El Paso, Tex., for constructing the roadbed, bridges and culverts for a line from the A., T. & S. Fe, at a point between Engle, N. Mex., and Cutter, to the Engle dam site near Elephant Butte, about 10 miles. The work involves the excavation of about 14,000 yds. of earth, 56,000 yds. of rock and the placing of approximately 400,000 ft. of timber.

**WILDWOOD & DELAWARE BAY SHORT LINE.**—An officer writes that contracts are to be let in July for building from Wildwood, N. J., northwesterly across the meadows to Rio Grande, about 3.50 miles, thence to Delaware Bay, an additional 3.75 miles. The work includes filling in about 2.50 miles of meadow land. There will be one steel and concrete bridge with a 35-ft. draw span, to have a total length of 250 ft. The company will also put up a power house, a dock and three stations during the coming fall and winter. Connection is to be made with the Philadelphia & Reading at Rio Grande, and at Delaware Bay with boat service to Philadelphia. E. G. Slaughter, general manager, Wildwood.

**WICHITA, KINSLEY, SCOTT CITY & DENVER AIR LINE.**—An officer writes that a contract has been given to the Air Line Construction Co. for building from Wichita, Kan., via Pretty Prairie, Turon, Kinsley, Jetmore, Scott City and Sharon Springs to Denver, Colo. Sub-contracts are being let for day labor to Bennett & Luttgerding. It is expected that the principal freight to be carried on the line will be wheat, corn and live stock. W. F. Brown, president, and J. E. Thayer, chief engineer, both of Turon. (March 11, p. 548.)

**WINSTON-SALEM SOUTHBOUND.**—An officer is quoted as saying that the company expects to have the line now under construction from Winston-Salem, N. C., south to Wadesboro, 88 miles, finished by the middle of October, and that bids are wanted for putting up 15 passenger and freight stations along the line. The line is being built jointly by the Atlantic Coast Line and the Norfolk & Western. O. H. P. Cornell, chief engineer, Winston-Salem. (Dec. 24, p. 1261.)



## Railway Financial News.

**BUFFALO & SUSQUEHANNA.**—The interest due July 1 on the first refunding 4 per cent. mortgage bonds was not paid at maturity. (May 13, 1910, p. 1237.)

**CHICAGO, CINCINNATI & LOUISVILLE.**—Judge Hollister has confirmed the foreclosure sale of this property and the following securities are called for payment: Receiver's certificates; first mortgage bonds of the Cincinnati, Richmond & Muncie, with coupons maturing April 1, 1908, and subsequent thereto; first mortgage bonds of the Chicago & Cincinnati, with coupons maturing February 1, 1908, and subsequent thereto; first mortgage bonds of the Cincinnati & Indiana Western, with coupons maturing June 1, 1908, and subsequent thereto.

Bondholders who have deposited their bonds under the agreement of March 14, 1908, are to receive payment as follows: \$1,109.50 for each \$1,000 bond of the Cincinnati, Richmond & Muncie; \$1,120.46 for each \$1,000 bond of the Chicago & Cincinnati, and \$1,100.67 for each \$1,000 bond of the Cincinnati & Indiana Western.

A new company, the Chesapeake & Ohio Railway of Indiana, is being formed, it is said, to take over the Chicago, Cincinnati & Louisville.

**CHICAGO, MILWAUKEE & ST. PAUL.**—This company has made a payment of \$4,000,000 to the National City Bank of New York, being the second instalment on \$14,000,000 which it borrowed early in the year. The balance sheet of February 28 shows \$5,000,000 of this debt in the form of bills payable. The remaining \$9,000,000 was borrowed during the first part of March. The first payment in the bank amounted to \$6,000,000, and was made the first week in June, when the St. Paul received the initial payment of \$8,000,000 from the Paris bankers on account of the new bond issue. Another \$1,000,000 falls due July 1 and the remaining \$3,000,000 will possibly be paid before the end of that month. The news of this loan has just been made public.

**CUBA RAILROAD.**—The New York Stock Exchange has listed \$2,510,000 additional first mortgage 5 per cent. 50-year bonds, making the total amount listed to date \$11,310,000. The proceeds of the sale of these bonds just listed is being used to pay for building the Bayamo extension and for ballasting and improving the right-of-way and station buildings on extensions and branch lines.

**DES MOINES & FORT DODGE.**—The annual dividend, heretofore 5 per cent., payable August 1, on the preferred stock has been passed. The company is controlled by the Minneapolis & St. Louis, which recently passed the 2½ per cent. semi-annual dividend on its preferred stock. There is \$763,500 preferred stock of the Des Moines & Fort Dodge outstanding.

**GALVESTON, HARRISBURG & SAN ANTONIO.**—Judge Maxey in the suit brought to foreclose \$6,304,000 Western division, second mortgage income bonds has sustained the general demur of the plaintiff. The plaintiffs are given until the first Monday in August to file an amended complaint.

**INTERNATIONAL & GREAT NORTHERN.**—The Special Master in Chancery has allowed the following claims against the company: George J. Gould, \$3,589,788; Frank J. Gould, \$181,941; George Gould, \$128,531; Helen Gould, \$172,798; Edwin Gould, \$172,798. The hearing on all claims that seek preference over the bondholders will be held in Dallas, Texas, about June 6.

**KANSAS CITY, FORT SCOTT & MEMPHIS.**—This company has sold to Philadelphia bankers a little over \$1,000,000 4 per cent. refunding bonds of 1901-1936. The road is a part of the St. Louis & San Francisco system. There are \$492,000 Memphis, Colorado & Kansas first mortgage 7 per cent. bonds due September first.

**KANSAS CITY, MEXICO & ORIENT.**—This company has sold \$5,000,000 first mortgage, 50 year, 4 per cent. bonds to a syndicate of English brokers. President Stillwell is quoted as

saying that this sale of bonds will furnish sufficient money to complete the extension from San Angelo, Texas, to Del Rio, where a connection will be made with the National Railways of Mexico. This will give the Orient road a direct connection between Kansas City and Mexico City.

**KENTUCKY & INDIANA BRIDGE RAILROAD CO. (LOUISVILLE, KY.)**—The company has arranged to make a new mortgage securing an issue of bonds, of which about \$2,000,000 will be sold to pay for a new double-track bridge over the Ohio river and \$2,000,000 bonds will be reserved for improvements. There are now outstanding \$1,000,000 first mortgage 5 per cent. bonds, due 1911, and \$1,069,000 consolidated 4 per cent. bonds, due 1950. Daniel Willard, president of the Baltimore & Ohio, and Fairfax Harrison, vice-president of the Southern Railway, have been elected directors, succeeding Governor Harmon and C. L. Harris.

**MEXICAN UNION.**—The Banco di Roma in Paris is offering 9,750 first mortgage 6 per cent. bonds, par value 500 francs (\$100) at 465 francs each (\$93). These bonds are secured on 91 miles of line running from Torres, on the Sonora branch of the Southern Pacific, to Torrich, on the Yaqui river.

**MINNEAPOLIS & ST. LOUIS.**—See Des Moines & Fort Dodge.

**MISSOURI, KANSAS & TEXAS.**—The company has sold to Speyer & Co., New York, \$10,000,000 one-year 5 per cent. notes. The proceeds from the sale of these notes are to be used to pay for the new terminal at St. Louis, to buy new equipment and to pay for the stock of the Texas Central. The M., K. & T. has acquired \$3,856,400 of the total authorized issue of \$4,000,000 Texas Central stock. The Texas Railroad Commission is to be asked to approve the exchange of the outstanding capital stock of the Texas Central into \$3,700,000 consolidated mortgage 6 per cent. bonds and \$300,000 stock. It is understood that if the commission approves this exchange, all of the consolidated mortgage bonds and stock will be pledged to secure the present issue of \$10,000,000 M., K. & T. notes. The notes are being offered by Speyer & Co. at 99, yielding about 6 per cent. on the investment.

**MUSCATINE NORTH & SOUTH.**—The company has filed a mortgage securing \$1,000,000 first mortgage 5 per cent. bonds maturing 1935. The line runs from Muscatine to Elrick Junction, 29 miles.

**NATIONAL RAILWAYS OF MEXICO.**—This company on June 30 took over the ownership and control of the Mexican International and the Mexican Pacific.

A dividend of 2 per cent. has been declared on the \$28,830,200 preferred stock from the earnings of the six months ended June 30. This compares with 1 per cent. previously paid semi-annually since August, 1908.

**PITTSBURGH, SHAWMUT & NORTHERN.**—The United States circuit court has authorized the receiver to issue \$1,500,000 receiver's certificates of August 1, 1910, to run five years (subject to redemption at a premium of 1 per cent. to 5 per cent.), for improvements to the Shawmut Mining Company and the Kersey Mining Company's property.

**TEXAS CENTRAL.**—See Missouri, Kansas & Texas.

**WABASH.**—The directors have declared a semi-annual dividend of 3 per cent. on the Debenture "A" bonds and 2 per cent. on the Debenture "B" bonds, payable July 1. This is at the same rate as the last semi-annual payment made in January and makes 6 per cent. paid on the "A" bonds and 4 per cent. paid on the "B" bonds in 1910. This compares with 6 paid on the "A" bonds and 2 paid on the "B" bonds in 1909.

**WESTERN OHIO RAILWAY.**—Stockholders have voted to authorize a second mortgage for \$500,000 to increase the authorized capital stock from \$3,400,000 to \$4,000,000, and lease the property of the Western Ohio Railroad. Holders of railway income stock are offered the privilege of exchanging their stock for one-third in Railroad stock.

**WHEELING & LAKE ERIE.**—The receiver has applied to the United States district court for authority to issue \$200,000 receiver's certificates to pay for tools, machinery and other equipment for a new shop at Brewster, Ohio.

# Supply Trade Section.

T. F. Howe has resigned as general manager of the Milwaukee Car Mfg. Co., and the Milwaukee Refrigerator Transportation Co., to become secretary of the Calumet Engineering Co., Chicago and Harvey, Ill.

N. R. McLure, recently assistant engineer of the Phoenix Bridge Company, Philadelphia, Pa., has been appointed resident engineer at St. Louis, Mo., in charge of the western interests of the company. Mr. McLure succeeds O. J. West, who has resigned.

H. H. Hirschfeld, of the firm of Richards & Hirschfeld, New York, will sail July 16 for a business trip through Cuba and Mexico. Richards & Hirschfeld are export agents for the American Saw Mill Machinery Co., Hackettstown, N. J., and of the American Saw Works, Hackettstown; they also act as purchasing agents for foreign railways.

Isaac B. Connor, formerly with the Galena Signal Oil Co., Franklin, Pa., and Adolph J. Varrelmann, formerly with the Fay-As-You-Enter Car Corporation, New York, have entered the service of the Indian Refining Co., Inc., Cincinnati, Ohio. Mr. Varrelmann will have headquarters at New York. Both gentlemen will be identified with the railway lubrication department.

Among the orders recently placed with the Crocker-Wheeler Company, Ampere, N. J., are the following: Two 1,000-k.w. engine type generators, Republic Iron & Steel Co., Hazleton plant; one 500-k.w. engine type generator, A. M. Byers Co., Pittsburgh, Pa.; one 300-k.w. engine type generator, H. Lauter Co., of Indianapolis; one 175-h.p. auxiliary pole motor, Orford Copper Co., of New Jersey; one 1,000-k.v.a. engine type a.c. generator and one 150-k.v.a. engine type generator, Big River Lumber Co., Saskatchewan, Canada; one 150-k.v.a. engine type a.c. generator with exciter, town of Julesburg, Colorado; one 300-k.v.a. belt type a.c. generator with exciter, York Card & Paper Co., of Pennsylvania; two 500-k.w. synchronous motor-generator sets, Gary plant of the American Sheet & Tin Plate Co.

A suit for infringement of trade mark was brought in the United States Circuit Court over two years ago by James B. Sipe & Co., Pittsburgh, Pa., against the Columbia Refining Co., New York. The Columbia company has for several years past been manufacturing and selling a paint oil under the name "Japinol," while James B. Sipe & Co. have been manufacturing and selling a paint oil for the past 25 years under the registered trade mark "Japan Oil." On May 6, 1910, U. S. Circuit Court Judge Lacombe, of the Southern district of New York, issued a decree perpetually enjoining and restraining the Columbia Refining Co. from using in any manner whatsoever the word "Japinol" or any other word so closely resembling James B. Sipe & Co.'s trade mark "Japan Oil" as to be misleading to the trade. The defendant company also paid James B. Sipe & Co. a substantial sum in lieu of damages, costs, etc.

The note in our issue of June 24, page 1418, concerning the injunction restraining the General Railway Signal Co., Rochester, N. Y., from making or selling certain devices in connection with automatic signals on electrically operated lines, was not complete. Judge Ray, of the United States Circuit Court, had granted an interlocutory injunction in favor of the Union Switch & Signal Co., Swissvale, Pa., as mentioned above. The General company having signified its intention of taking an appeal from this decision, Judge Ray, on June 8, ordered that, pending this appeal, the accounting and the operation of the injunction as against all acts except the taking or filling of new contracts be suspended. This order, however, was made dependent upon certain conditions, the last of which was that the General company could at any time, after giving notice to the Union company's counsel, apply to one of the judges of the Circuit Court of Appeals for the Second Circuit for permission to bid upon, take or fill new contracts. The other conditions were that the General company should take its appeal within 30 days from June 8 and prosecute it with diligence, and also that it should within 30 days file a bond of \$10,000, covering costs and damages awarded by the final decree in case of affirmance.

## TRADE PUBLICATIONS.

*Fire Expanders.*—Gustav Wiedeke & Co., Dayton, Ohio, have issued bulletin No. 130, which describes the flue expanders made by this company.

*Railway Supplies.*—The Walter A. Zelnicker Supply Co., St. Louis, has issued its list No. 107 covering the rail equipment and machinery supplies which it has on hand.

*Sand Rammers.*—The Ingersoll-Rand Co., New York, has issued form No. 8108 describing its Crown bench and floor pneumatic sand rammers for foundry and concrete work.

*Steel Tie.*—The York Rolling Process Co., New York, has issued a pamphlet describing its York steel tie. A number of drawings show sections and the application of rails to this tie.

*Six-Wheel Truck.*—The J. G. Brill Co., Philadelphia, Pa., has just issued a catalogue describing its No. 27-M.C.B. six-wheel passenger truck. Both line and half-tone illustrations are included.

*Wood Preservatives.*—The Barrett Manufacturing Co., New York, has issued a pamphlet containing information relative to the decay of wood and the use of its Creo-Carbolin, a liquid oil produced from coal tar.

*Railway Frogs and Crossings.*—The Conley Frog & Switch Co., Memphis, Tenn., has issued catalogue No. 2 describing the Conley patent frog and all the standard and special frogs, switches, crossings, switch stands, rail braces and track equipment made by this company.

*Construction Work.*—The Stone & Webster Engineering Corporation, Boston, Mass., has issued a pamphlet which contains a list of completed and uncompleted construction work of this company, covering steam power stations, water power development, railway construction, building construction, sub-stations, etc.

*Line Material.*—The Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., has issued catalogue No. 10 on direct suspension, low voltage, line material. This catalogue contains 200 pages, printed on heavy glazed paper, bound in cloth board. The railway line material made by this company is intended to meet all the requirements of either bracket arm or cross span types of direct suspension railway construction, and to be equally applicable to either direct current or alternating current systems for potentials not exceeding 750 volts. All of this material is shown in list form, with specifications and prices in each case.

## RAILWAY STRUCTURES.

ALPENA, MICH.—Spier, Rohns & Gehrke, architects, Detroit, Mich., will receive bids until July 12 for building a one-story brick and stone passenger station, 40 ft. x 125 ft., for the Detroit & Mackinac.

CHICAGO.—An officer of the Pennsylvania Railroad writes that the lines occupying what is known as the union station in Chicago have had under consideration for some time the question of rebuilding the station. Plans have not been prepared because of contemplated action of the municipal and federal authorities in requiring bridges with such spans across the Chicago river, that the encroachment of the abutments of these bridges on railway property would be so great that it would prevent the location of a station on the present site. It is now believed that the proper authorities will agree upon such length of span for bridges over the river, that the abutments will not encroach upon railway property to such an extent as to prevent its full use for railway purposes. The railways, however, cannot prepare plans for the contemplated improvements until they know that this is an assured fact. See an item in General News.

CHICKASHA, OKLA.—An officer of the Chicago, Rock Island & Pacific writes that the company is arranging to build a viaduct jointly with the city authorities of Chickasha, at Choctaw ave-



nue, over the Rock Island tracks. No definite agreement has yet been made and the design of the structure has not been decided upon.

CINCINNATI, OHIO.—According to press reports, an ordinance was recently passed by the City Council granting the necessary franchises for carrying out the proposed improvements, to include a union terminal station on the north side of Third street, between Walnut and Main streets. (May 27, p. 1327.)

GALVESTON, TEX.—The Gulf, Colorado & Santa Fe has secured property adjacent to the Union Station for the purpose of making improvements on the building and yards.

GOLDFIELD, NEV.—The Tonopah & Goldfield has let the contract to Charles Kline for building the shops, roundhouses and other buildings mentioned in the *Railway Age Gazette* of June 10.

GRAFTON, W. VA.—The Baltimore & Ohio has let the contract to J. J. Walsh, Baltimore, Md., for building a \$100,000 passenger station.

GREENVILLE, PA.—According to press reports, the Bessemer & Lake Erie will put up a new roundhouse in Greenville.

LOUISVILLE, KY.—The Kentucky & Indiana Bridge & Railroad Co. has let the contract to the Foster-Creighton-Gould Co., Nashville, Tenn., for the substructure of the new Ohio river bridge. The contract includes eight concrete piers requiring about 25,000 cu. yds. of concrete. (July 1, 1910, p. 57.)

McCOMB, MISS.—The Illinois Central has bought 100 acres of land on which to build reservoirs to have a capacity of 1,000,000,000 gallons. A pumping plant and pipe line will distribute the water to shops.

MEMPHIS, TENN.—The Memphis Union Station Co. has let the contract to J. A. Omberg, Memphis, for building a concrete viaduct from Railroad to Calhoun avenue. The estimated cost is \$80,000.

NEWBERN, N. C.—A contract has been given to D. J. Phipps and work was started July 1 on a brick passenger station at Queen street, in Newbern, for the Norfolk Southern and the Atlantic Coast Line. The building is to be two stories high, 32 ft. x 138 ft., and will cost about \$35,000.

OMAHA, NEB.—An officer of the Missouri Pacific writes that nothing definite has yet been decided regarding the construction of a viaduct over the railway tracks at Nicholas or Izard streets in Omaha.

OTTAWA, ONT.—Bids have been received by the department of railways and canals for the superstructure of a bridge over the Saskatchewan river on the line of the Hudson Bay Railway. The structure will consist of four fixed spans of 147 ft. each and one swing span of 262 ft.

PALMYRA, PA.—The Philadelphia & Reading, it is said, will put up a new passenger station at Palmyra to replace the present wooden structure.

PROVO, UTAH.—The contract has been let for building the new union station at Third, West and Sixth South streets in Provo. The estimated cost of the building is \$50,000, and it is expected that it will be completed by next October. (Aug. 6, 1909.)

SACRAMENTO, CAL.—According to press reports, the electric lines in Sacramento have asked permission from the War Department to build a bridge at M street, in Sacramento. (Jan. 7, p. 71.)

SEATTLE, WASH.—The Oregon & Washington has let the contract to Grant, Smith & Co., Seattle, for building the concrete viaduct and retaining wall in connection with the new passenger station. (June 3, 1910.)

SOUTHEAST, N. Y.—The New York Public Service Commission, Second district, has ordered the highway crossing, known as Griffins Highway passing over the New York & Harlem Railroad in the town of Southeast, Putnam county, closed and discontinued. The highway is to be carried over the existing tracks by a steel viaduct and other adjacent tracks to be constructed. The New York Central & Hudson River is to pay the entire cost of the improvements.

WINSTON-SALEM, N. C.—See Winston-Salem Southbound under Railway Construction.

## Late News.

*The items in this column were received after the classified departments were closed.*

At conferences between the Delaware, Lackawanna & Western officers and the locomotive enginemen a proposition was submitted to the grievance committee representing the men, which carries with it an increase roughly estimated at 9¼ per cent. This means that the original demand of the enginemen for higher wages is refused on the ground that the demand is exorbitant.

The Interstate Commerce Commission on complaint of the St. Paul Board of Trade v. Minneapolis & St. Paul has decided that the defendant may make a distinction in its rates between shipments originating at the concentrating points, so far as its line is concerned and traffic on which it has had a haul into the concentrating points; but it may do this only under proper tariff provisions connecting the inbound with the outbound movements and then only when the inbound movement to the concentrating point proceeds under rates on file with the commission.

A press despatch says that the Blue Island Rolling Mills & Car Co., formerly the Blue Island Car & Equipment Co., one of five corporations charged with defrauding the Illinois Central out of about \$1,500,000 in connection with repairing freight cars, has settled out of court by the payment of a sum variously stated to be between \$400,000 and \$500,000. The total claim of the Illinois Central road against the car company was \$600,000. The settlement was followed by dismissal of all court proceedings. See page 92 in regard to the I. C. suit against the Memphis Car Co.

The Erie and the Delaware, Lackawanna & Western in the supreme court at Binghamton, N. Y., July 6, entered pleas of guilty to the indictments charging violations of Section 11 of the state labor law, which requires the semi-monthly payment of employees. Last year 12 indictments were found against the two roads, six against each, covering violations of the law. Action on the indictments has been suspended pending appeal. Judge Gladding imposed fines of \$100 on each indictment; \$600 against each defendant. Officers of the Erie are quoted as saying that it costs that company \$60,000 more a year in its book-keeping and timekeeping system to comply with this law.

Governor Fort, of New Jersey, in refusing to call a special session of the legislature to consider the increase in commutation rates, said: "I think, with many others, that the railways in raising rates have acted hastily. Still all must concede that they are within their legal rights, if it is shown that the increase is reasonable and just. This presents, in my judgment, a judicial question and should be determined on the proofs adduced in evidence. It cannot be rightly settled by prejudice nor by what is even worse, partisan political considerations. These changes in the schedules, for the most part, affect those who make daily journeys from New Jersey into New York. In respect to such interstate travel New Jersey has no jurisdiction, and, therefore, can exercise no control, either directly or indirectly. Any attempt by the legislature of this state, whether in special or regular session, to deal with this question, would be unwarranted and unlawful.

The Canadian Northern has given a contract for the construction of the line from Virginia, Minn. south to Duluth, 75 miles, to Foley, Welch & Stewart, of St. Paul. This new line will form part of a through line from Winnipeg to Duluth, while connections with Chicago will be complete within a year.

The cost will be \$35,000 a mile, a total expenditure of over \$2,500,000. The right of way for the entire distance has been secured. The company contemplates the erection in Duluth of independent terminals at the waterfront and part of the wharfage is already secured. (June 3, p. 1390.)

The initial step in the construction of the government line to Hudson Bay was taken recently when a contract was let for the construction of the superstructure of the bridge across the Saskatchewan river at Lepas Junction, the present terminus of the Canadian Northern line. This bridge will provide a route for supplies to the far North for the Hudson Bay line. Actual work will be started this month.

## Equipment and Supplies.

### LOCOMOTIVE BUILDING.

The Atlantic Coast Line has ordered six consolidation locomotives from the Baldwin Locomotive Works.

The Central South African Railways have ordered 10 Mallet locomotives from the American Locomotive Co.

The Delaware & Hudson has ordered one six-wheel saddle tank locomotive from the American Locomotive Company.

The Nashville, Chattanooga & St. Louis has ordered 10 consolidation locomotives from the Baldwin Locomotive Works.

The Central South African Railways have ordered 10, 2-6-6-2 Mallet locomotives from the American Locomotive Company.

The Chicago Short Line Railway has ordered one eight-wheel switching locomotive from the American Locomotive Company.

The Baltimore & Ohio has ordered 50 Mikado locomotives from the Baldwin Locomotive Works and is asking prices for 30 Mallet locomotives.

The National Railways of Mexico have ordered six Mallet locomotives from the Baldwin Locomotive Works for use on the Mexican International.

Haney, Quinlan & Robertson, railway contractors, Toronto, Canada, have ordered four four-wheel saddle tank locomotives from the American Locomotive Company.

The Illinois Traction System is building six heavy electric locomotives at its shops in Decatur, Ill. They will be equipped with four General Electric, 600-h.p. motors with Sprague-General Electric, multiple unit type M control. The trucks will be furnished by the American Locomotive Company and the air-brakes will be Westinghouse EL. The locomotives will resemble in general outline the steel turtle-back cars in use on this line, and will be 34 ft. long, 9 ft. 3 in. wide. They are to be equipped with M. C. B. couplers and steel pilots.

### CAR BUILDING.

The Illinois Tunnel Co., Chicago, has ordered from the Kilbourne & Jacobs Mfg. Co., 500 tram cars for operation in the Chicago freight tunnel.

The Carolina, Clinchfield & Ohio, reported in the *Railway Age Gazette* of June 3 as being in the market for 250 box cars, has added 100 stock cars to this inquiry. Bids on this equipment have been received.

The United Fruit Company, reported in the *Railway Age Gazette* of June 10 as being in the market for freight cars, has ordered 190 steel underframe, narrow gage box cars from the Wonham-Major Car & Mfg. Co.

### MACHINERY AND TOOLS.

The Chicago, Rock Island & Pacific is in the market for 12 machine tools.

The Baltimore & Ohio has ordered from the Allis-Chalmers Co., Milwaukee, Wis., one 300-k.w. synchronous motor generator set which will be used in generating the power for the new ore dock being erected at Lorain, Ohio.

The General Traction Development Co., Cleveland, Ohio, is financing and building a 4,000-h.p. hydro-electric power plant for the Georgian Bay Power Co., Ltd., Toronto, Can. Bids will shortly be asked for the power plant equipment.

The Wheeling & Lake Erie is understood to be in the market for a large number of machine tools for its new shops at Brewster, Ohio. A list of tools required for these shops was given in the *Railway Age Gazette* of July 1, in connection with a descriptive article on these shops.

The Chicago, Milwaukee & St. Paul is in the market for the following machine tools:

- One 36-in. upright drill.
- One 20-in. screw cutting engine lathe.
- One 24-in. high-duty drill.
- One sensitive friction drill.
- One 16-in. screw cutting engine lathe.
- One back-geared engine lathe with 18-in. x 8-ft. bed.

The Chicago, Burlington & Quincy machine tool inquiry, previously reported in the *Railway Age Gazette*, includes the following:

- One 50, one 30, and one 15-ton forcing presses.

- One 36-in. vertical turret lathe.
- One 30-in., two 15-in., one 51-in., and one 100-in. boring mills.
- One 54-in., car wheel boring mill.
- One cylinder boring machine.
- One double head drilling machine.
- One four-spindle drill.
- One 24-in. and one 36-in. vertical drills.
- Three centering machines.
- One link radius grinder.
- One 3-in., and one 1½-in. arbor presses.
- One 24-in. gear cutting machine.
- Two 24-in. gear planers.
- One 6¼ x 26-in., one 4¼ x 30-in. and two 2½ x 26-in. turret lathes.
- One 24-in. shaper.
- One 15-in. and one 18-in. slotters.
- Two four-spindle turret lathes.
- Two 22-in. drills.
- Three 18-in. portable boring lathes.
- One 20-in. and one 18-in. engine lathes.
- Two 3 x 36-in. and two 3¾-in. turret lathes.
- One four-spindle staybolt drill.
- Two 72-in. radial drills.
- Four 24-in. post drills.
- One 20-in. vertical drill.
- Two power hack saws.
- One 3½-in. drill grinder.
- Four double head grinders.
- One cutter and reamer grinder.
- One die grinder.
- One 12 x 40-in. universal grinder.
- One six-spindle staybolt machine.
- One 4-in. single head bolt cutter.
- One 1-in. three-spindle bolt cutter.
- One 1-in. four-spindle nut tapper.
- One 100-lb. and one 200-lb. power hammers.
- Two 1500-lb. steam hammers.
- One 100-in. quartering machines.
- One cold saw.
- One pipe bending machine.
- Two pressure blowers.
- Two 36-in. double punch and shears.
- One staff riveter.
- One horizontal flanging punch.
- One 18-in. single-end punch.
- Two 18-in. single end shears.
- Three double head dry grinders.
- One 1-in. forging machine.
- One rotary sand shifter.
- One car wheel press.
- One flue welder.
- One tool, one babbitt, one brazing, two blowing out, one heavy forging and one case-hardening furnaces.
- One metal melting furnace.
- One brass rattler.
- One lifting magnet.
- Two double head dry grinders.

### IRON AND STEEL.

The Erie is taking prices on 1,500 tons of structural steel

The Florida & East Coast is taking bids on 6,000 tons of structural steel.

The Cleveland Railway has ordered 3,500 steel ties from the Carnegie Steel Co.

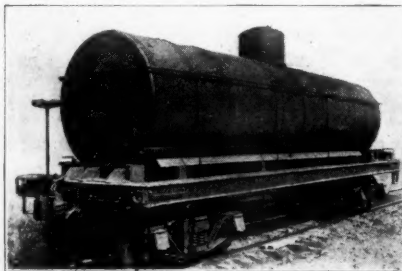
The National Railways of Mexico are in the market for 25,000 to 30,000 tons of rails.

The Pennsylvania is taking prices on bridge steel for two bridges of 190 tons each.

The Chicago, Milwaukee & St. Paul has ordered 450 tons of bridge steel from the Wisconsin Bridge & Iron Co.

### Steel Frame Tank Cars.

The Kennicott Co., Chicago Heights, Ill., has built and equipped a special shop for the construction of steel frame tank cars, and has added this department to its older lines of building water softeners and fabricating steel plate work, such as boilers, stacks and caissons. The company has made car tanks for some time and can still furnish them separate, but it is now prepared to build complete cars of special patterns to suit the purchaser, and can fill such orders promptly.



Steel Frame Tank Car.

The accompanying cut shows one of the cars recently built by the Kennicott Co. for a private car line. This car conforms to M. C. B. standards and has the following points of merit: a strong diamond frame arch bar truck, a four sill steel car body, a substantial head block, and a stout support for the tank. A heater is provided to enable commodities such as lard and molasses to be handled in these cars.